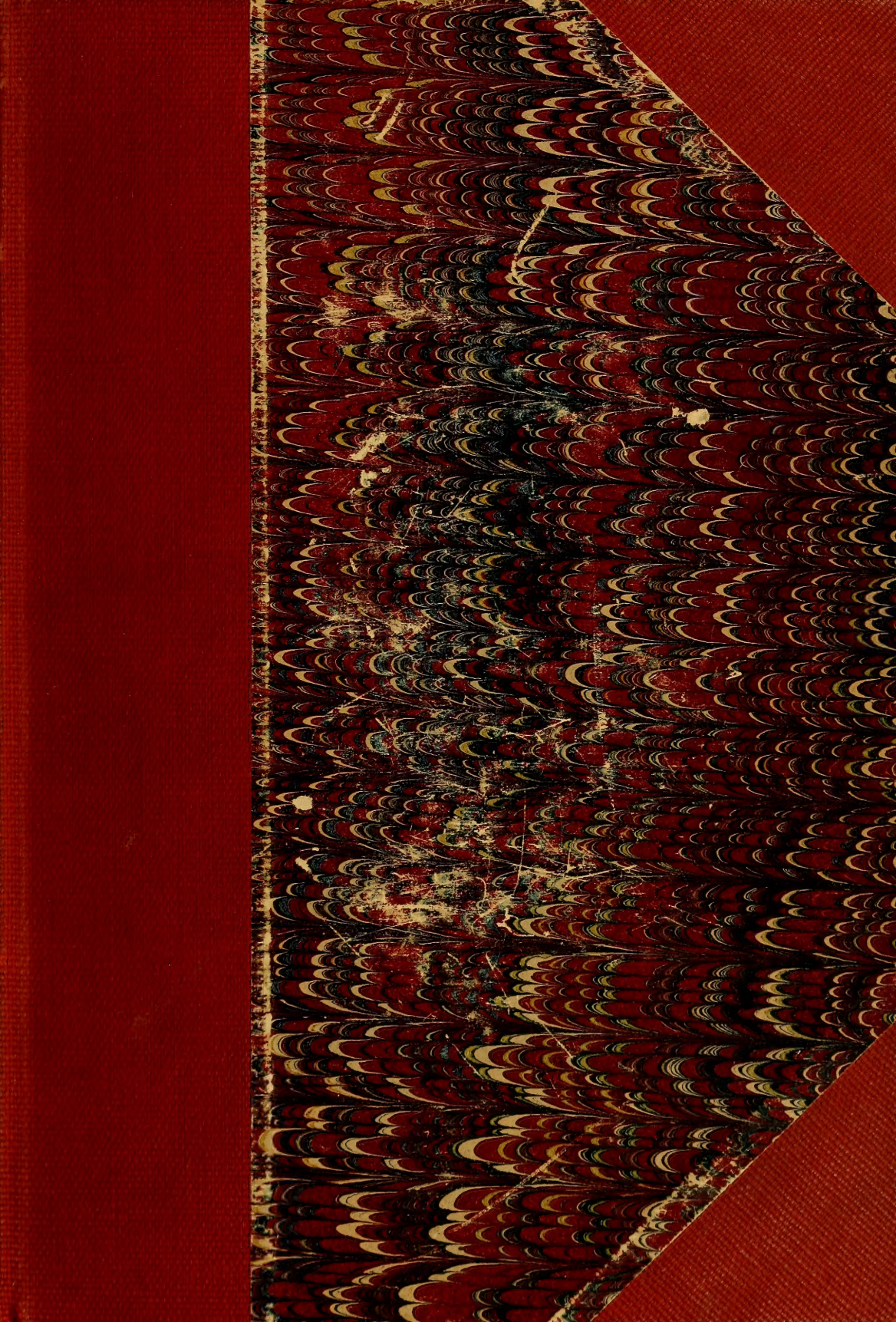






801
1716

HARVARD UNIVERSITY.



LIBRARY

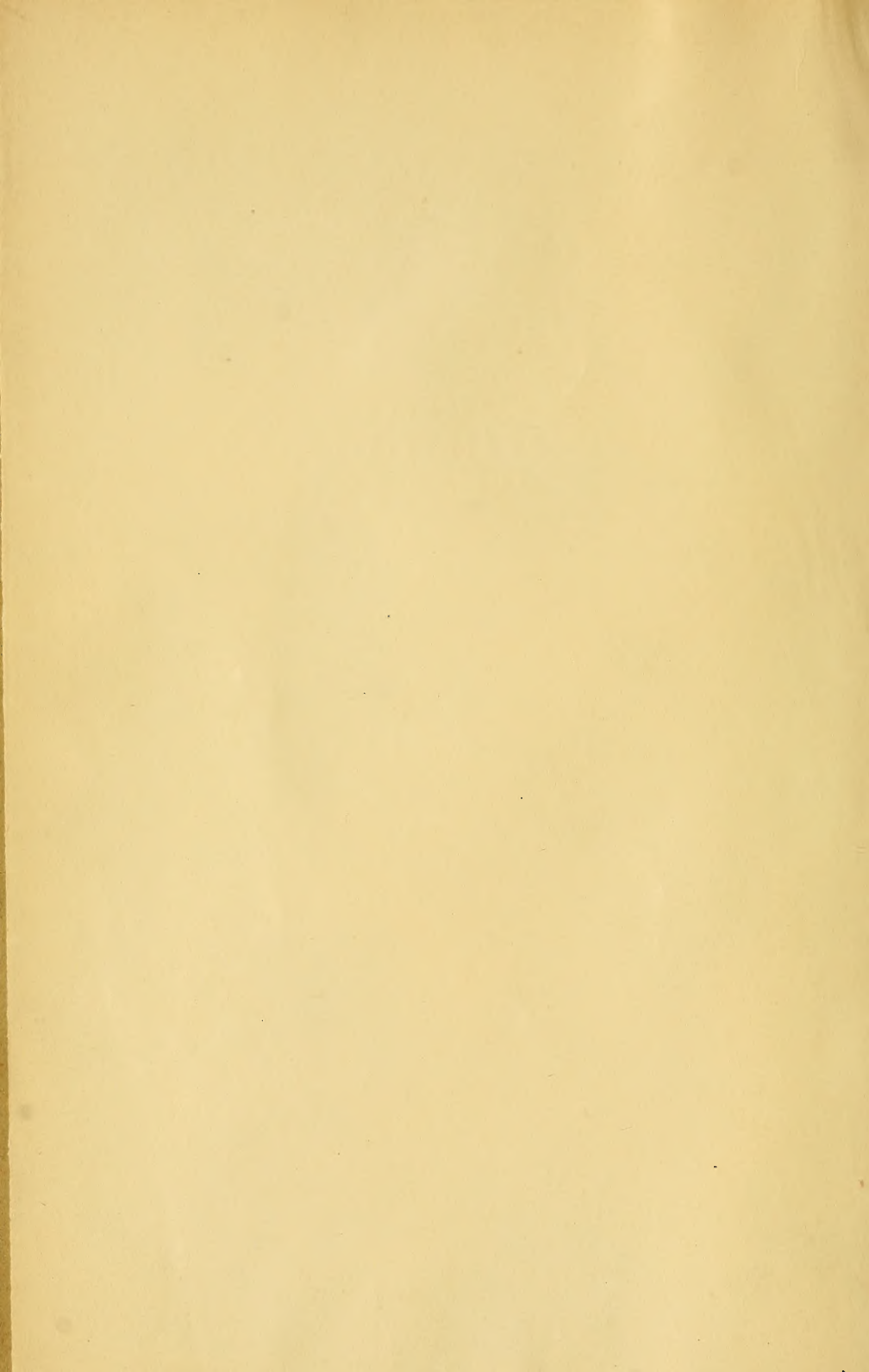
OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

13,961

Bought

August 16, 1920 - July 7, 1921.



13,961

BULLETINS
OF
AMERICAN
PALEONTOLOGY
VOL. 8

March 1919—March 1921

— * —

^THarris Co.
Cornell Univ., Ithaca, N. Y.
U. S. A.
B.

CONTENTS OF VOL. VIII

BULL. NO. 33.— New or otherwise interesting molluscan species from the East Coast of America. By KATHERINE VAN WINKLE and G. D. HARRIS.....			Pl. 1-3,	Page 1-32
34.— Recent Molluscs of the Gulf of Mexico and Pleistocene and Pliocene species from the Gulf States. By C. J. MAURY	4,	33-148		
35.— Reprint of the more inaccessible Paleontological writings of R. J. L. Guppy. By G. D. HARRIS.....	5-14,	149-346		
36.— Illustrations and descriptions of fossil Mollusca contained in the Paleontological collections at Cornell University. By KATHERINE E. H. VAN WINKLE	15,	347-385		

CORRIGENDA

Bulletin 34, p. 71 (103), cut out *Antigona* (*Ventricola*) *calimorpha* Dall as extralimital. Not yet found in the Gulf of Mexico (Dall, 1921). Remove *pilula* Dall from synonymy with the above and refer to genus *Vesicomya*. Also extralimital.

Bulletin 36, p. 6, (352) 2d line, change *Volvula cyclindrica* to *Volvula cylindrica*.

ADDENDA

Bulletin 34, p. 26 (58). Under genus *Unio* add the following species : *musinus*, *alixus* and *sandrinus* Dall, Proc. U. S. N. Mus., 46, pp. 229-230, pl. 20, figs. 2, 4, 5, 6, 1914. Brackish water Upper Miocene or Pliocene, well near Alexandria, Louisiana, about 48 feet below the surface.

13,961

**BULLETINS
OF
AMERICAN PALEONTOLOGY**

— — — *

Vol. 8

* — — — —

No. 33

**New or Otherwise Interesting Tertiary Molluscan
Species from the East Coast of America**

BY

KATHERINE VAN WINKLE

AND

G. D. HARRIS

March 6, 1919

Cornell Univ., Ithaca, N. Y.
Harris Company

NEW OR OTHERWISE INTERESTING TERTIARY
MOLLUSCAN SPECIES FROM THE EAST COAST
OF AMERICA

BY

KATHERINE VAN WINKLE

AND

G. D. HARRIS

INTRODUCTION

In resuming an intensive study of the east American Tertiary molluscan fauna after an interval of about twenty years, devoted of necessity to other phases of investigation, the senior author finds that there has accumulated in our laboratory several little lots of fossils, odds and ends, so to speak, that will scarcely fit into the general systematic studies here being undertaken, for some time to come. But a knowledge of these fossils and their occurrence may not be without interest now to Tertiary geologists and paleontologists in that they may give suggestions as to where to look and what to look for in various out-of-the-way places.

The junior author has endeavored to clear up some of the obscure points in the molluscan faunas of the Eocene of Virginia and Trinidad, while the the senior author is responsible for what is said regarding those from the Carolinas and Texas.

REMARKS ON VIRGINIA EOCENE FOSSILS

By KATHERINE VAN WINKLE

The following notes and descriptions are based on material collected by members of the first cruise of the *IANTHINA* in Virginian waters in 1897. Most material, then new, has been subsequently described by members of the Maryland Geological Survey; and interesting geographic data on the Virginian beds have been published by members of the Survey of that State. However, these few additional notes seem worthy of publication.

Genus **LEDA** Schumacher**Leda cœlatella**, n. sp.

Pl. I Figs. 4, 5

Specific characterization.—Size and general form as indicated by the figures and explanations; rather thick; of the *cœlata* stock, but differing from the Claiborne form by its smaller size, less inflation medially, less relative contraction posteriorly and especially by its more primitive surface marking—great diagonal rugæ of nearly equal strength across the whole valve with only a down-dipping in the young stage as they approach the umbonal ridge, whereas in *cœlata* these rugæ are strong only on the sector just posterior to the middle; in advance of the same such markings become fainter, swing upward across the channel from beak to antero-basal margin and finally resume their former direction till they reach the margin of the shell; lunule, escutcheon and post-umbonal markings very similar to those of *cœlata*, though the radial ribs are more generally and coarsely granulate, thus recalling *cœlatoides*.

Types and specimens figured.—Paleontological Museum, Cornell Univ.

Horizon.—Probably lower St. Maurice Eocene.

Locality.—New Castle, Va. Collected by 1st Ianthina Expedition, '97.

Genus **CORBULA** Bruguière

Anapteris, new subgenus

Description.—Lesser or left, only valve known; large, flat, surface of shell strongly corrugated, this corrugation extends to the anterior margin where the extreme, anterior portion of the valve appears as though it had been broken; on the interior of the shell this area corresponds to a wing or flare which is bounded below by a strong ridge; this ridge suggests the original margin of the valve. The wing bears very fine, radiating striæ.

Anapteris regalis, n. sp.,

Pl. I Fig. I, 3

Description.—Size and shape of shell as indicated by the figures. Left valve nearly flat, thick, dorsal margin bent outward, giving intimation of a gape; a pronounced carina extends from the beak to the posterior margin. Surface ornamented with prominent, concentric lines which extend from the umbonal ridge to the anterior end where they terminate in a peculiar manner as though the anterior end had been broken; on the posterior portion of the shell anterior to the umbonal ridge where the lines merge into the ridge a separation of the lines occurs giving place to very short, equally prominent, surface markings. Just anterior and parallel to the umbonal carina is a fine channel; the prominent lines posterior to the umbonal ridge extend almost vertically to the dorsal margin. On some specimens two slight channels are noted which are situated between the dorsal margin and the posterior ridge and extend from the beak to the posterior margin; on the anterior internal surface of the left valve a raised margin-like ridge extends from the beak concavely, and then rounds into the ventral margin; the portion of the shell dorsal to the ridge has the appearance of a flare or wing. The projecting, cartilage process in the left valve in this form differs from that in the genus *Corbula*, in having only a very narrow, short, posterior groove; the anterior groove is slightly marked, in some cases practically obsolete.

Types and specimens figured.—Paleontological Museum, Cornell Univ.

Horizon.—St. Maurice Eocene.

Localities.—Newcastle, Piping Tree, Va; collected by the 1st Ianthina Expedition, '97.

Genus **FICUS** Klein

Ficus affinis, n. sp.,

Pl. I Fig. 10, a.

Description.—Size and shape of shell as indicated by the figures; whorls five; last two whorls of spire smooth; whorls very convex; surface ornamented by numerous, subequally spaced, longitudinal ribs; the intersection of the ribs gives the surface of the shell a cancellated appearance; both the longitudinal and revolving lines extend over the full length of the body whorl and the first two whorls of the spire.

This form resembles in general outline the species *Ficus mississippiensis* (Conrad) from Vicksburg but differs in the greater regularity of the revolving ribs, in the smaller interspaces between the revolving ribs and in the absence of finer, intervening, revolving lines which are characteristic of *F. mississippiensis*. These lines vary in the young and adult stages of the Vicksburg form, from one to two in number. A single, partially developed, intervening line is noted on a specimen of *F. affinis*. The general resemblance of the two species seems to indicate *F. affinis* as the ancestor of *F. mississippiensis*.

Types and specimens figured.—Paleontological Museum, Cornell Univ.

Horizon.—St. Maurice Eocene.

Locality.—James river, just below City Point, Va.; 16 or 17 miles above Newburn, on the Neuse river, N. C. Collected by the 1st Ianthina Expedition, '97

Genus **SOLARIUM** Lamarck

Solarium ianthinæ, n. sp.

Pl. I Figs. 7, 8, 9

Description.—Size and general shape of shell as indicated by the figures; whorls five or six; slightly convex; two revolving channels or furrows extend on the surface of the whorls dividing each whorl into three equal, slightly, elevated areas; about one-

third the distance between the suture and the upper furrow a fine groove occurs which gives to the upper portion of the whorl the appearance of a narrow ridge. Numerous longitudinal striæ occur over the whole surface of the whorls, much enlarged on the margin of the whorl just below the suture, giving a slight crenulated appearance; base flat.

Type and specimens figured.—Paleontological Museum, Cornell Univ.

Horizon.—St. Maurice Eocene.

Locality.—James river, just below City Point, Va. Collected by the 1st Ianthina Expedition, '97.

Genus **ADEORBIS** S. Wood

Adeorbis novi-castri, n. sp.,

Pl. I Fig. 11, 12

Description.—Size and general shape as indicated by the figures; whorls four or five; spire depressed; suture area excavated; whorls marked with a strong carina just above the suture; surface smooth except for fine lines of growth. Body whorl discoidal, ornamented with three very strong, equally distant carinæ; aperture subovate, posterior margin straight; umbilicus moderately large, surface decorated with fine, regularly, revolving striæ; base convex, smooth; at about the middle of the volution of the body whorl the basal carina divides, gradually producing two ribs or ridges of equal size with a slight interspace; they appear to merge into the aperture as one carina, but examination under the microscope shows the dual character.

Type figured.—Paleontological Museum, Cornell Univ.

Horizon.—St. Maurice Eocene.

Locality.—Newcastle, Va. Collected by 1st Ianthina Expedition '97.

Adeorbis? virginiensis, n. sp.,

Pl. I Fig. 13

Description.—Size and shape as indicated by the figures; whorls five; suture appressed; surface ornamented by very fine, revolving striæ which occur on the lower portion of each whorl, beginning at the suture and extending about half the width of

the whorl; the remaining portion of the whorls smooth except for fine lines of growth; near the suture, on the uppermost portion of the preceding whorl a heavy, revolving line or groove extends which gives the surface an appressed-ridged appearance. On the body whorl, the fine, revolving lines of the lower portion extend continuously over the margin and probably over most of the surface of the base.

Types and specimens figured.—Paleontological Museum, Cornell Univ.

Horizon.—St. Maurice Eocene.

Locality.—Newcastle, Va. Collected by the 1st Ianthina Expedition '97.

GEOGRAPHICAL DISTRIBUTION OF MID-EOCENE FAUNA OF THE VIRGINIA BASIN

PELECYPODA

Anapteris regalis, n. sp., Piping Tree.

Anomia lisbonensis Aldrich, Coggins Point.

Anomia marylandica C. & M., Port Royal.

Corbula alabamiensis Lea, Port Royal, Ratcliff, Piping Tree, Newcastle.

Corbula aldrichi Meyer, Popes Creek, Port Royal, Ratcliff, Piping Tree.

Corbula murchisoni Lea, Newcastle, Popes Creek

Crassatellites alæformis (Conrad), Potomac Creek, Piping Tree, below City Point, Coggins Point.

Cucullæa onochela Rogers, Potomac Creek, Newcastle.

Cucullæa transversa Rogers, Potomac Creek.

Dosiniopsis lenticularis Rogers, Potomac Creek.

Glycymeris idoneus (Conrad) ? Newcastle, Coggins Point.

Glycymeris, sp., Port Royal.

Lævicardium, sp., Coggins Point.

Leda magna Lea ? Coggins Point.

Leda improcera (Conrad), Port Royal, Marshfield, Woodstock

Leda cultelliformis (Rogers), Popes Creek, Woodstock.

Leda celatella, n. sp., Port Royal.

Leda, sp., Coggins Point.

Lucina alveata Conrad, Piping Tree.

Lucina dartoni Clark, Popes Creek.

Lucina papyracea (Lea), Newcastle.

Lucina uhleri Clark, Port Royal, Ratcliff.

Lucina whitei Clark, Popes Creek.

- Lucina claibornensis* Conrad, below City Point.
Nææra, sp., Newcastle.
Nucula potomacensis C. & M., Popes Creek, Newcastle, below City Point, Coggins Point, Piping Tree.
Meretrix ovata var. *pyga* Conrad, Potomac Creek, Popes Creek, Woodstock, below City Point, Coggins Point.
Meretrix lenis (Conrad), Port Royal.
Meretrix subimpressa Conrad, Popes Creek, Piping Tree, Newcastle, below City Point.
Meretrix, sp., Port Royal.
Modiolus alabamensis Aldrich, Potomac Creek, Popes Creek, Port Royal, Ratcliff.
Ostrea sellæformis Conrad, Popes Creek, Piping Tree, below City Point, Coggins Point.
Ostrea compressirostra Say, Potomac Creek.
Protocardia, sp., Popes Creek.
Pecten choctawensis Aldrich, Popes Creek.
Pecten greggi (Harris), Potomac Creek.
Pecten dalli Clark, Woodstock.
Semele linosa Conrad var. Harris, below City Point.
Spisula paralis (Conrad), Newcastle.
Teredo virginiana Clark, Popes Creek.
Tellina mooreana Gabb? Marshfield.
Tellina, sp., Popes Creek.
Tellina, sp., Piping Tree.
Venericardia planicosta var. *regia* Conrad, Potomac Creek, Popes Creek, Piping Tree?, Newcastle.
Venericardia potapocænsis C. & M., Potomac Creek, Coggins Point.

GASTROPODA

- Adeorbis novi-castrî*, n. sp., Newcastle.
Adeorbis? virginienensis, Newcastle.
Calyptraphorus trinodiferus Conrad, Port Royal, Piping Tree?, Newcastle.
Calyptraphorus velatus Conrad, Coggins Point.
Calyptraphorus, sp., Below City Point.
Calyptra aperta (Solander), Popes Creek, Newcastle, below City Point.
Caricella pyruloides? Conrad?, Below City Point.
Clavella hercules Whitfield?, Ratcliff.
Crepidula lirata Conrad, Newcastle, below City Point, Coggins Point.
Ficus affinis, n. sp., Below City Point.
Fusus? interstriatus Heilprin, Ratcliff.
Fusus irrasus Conrad, Newcastle.
Fusus subtenis Heilprin, Port Royal.
Fulguroficus argulus Clark, Potomac Creek.
Lunatia marylandica (Conrad), Potomac Creek, Piping Tree, Newcastle.
Lunatia, sp.,
Marginella, sp., Coggins Point.

- Mitra pomonkensis*, C. & M., Potomac Creek.
Plejona petrosa (Conrad), Potomac Creek, Ratcliff, Newcastle.
Pseudoliva vestuta var. *clausa* Harris, Newcastle.
Pseudoliva, sp., Coggins Point.
Solarium ianthinæ, n. sp., below City Point.
Strepsidura subscalarium Heilprin, Potomac Creek, Newcastle.
Teinostoma lævis (Meyer), Newcastle.
Teinostoma subrotunda Meyer?, Newcastle.
Tuba marylandica C. & M., Potomac Creek.
Tudicla, sp., C. & M., Ratcliff.
Turritella clevelandia Harris, Newcastle.
Turritella humerosa Conrad, Potomac Creek, Ratcliff, below City Point, Coggins Point, Fort Washington.
Turritella nasuta Gabb var. *houstonia* Harris, Ratcliff.
Turritella mortoni Conrad, Potomac Creek, below City Point.
Vermetus, sp., below City Point.

SCAPHOPODA

- Dentalium asgum* De Gregorio, Newcastle.
Dentalium minutistriatum Gabb, Newcastle.
Dentalium thalloides Conrad, Popes Creek, Newcastle.
-

Shark's teeth Potomac Creek, Newcastle.

A FEW MID-UPPER EOCENE FOSSILS FROM THE CAROLINAS AND TEXAS.

BY

G. D. HARRIS

The following specimens from isolated localities whose geologic horizons are for the most part not very definitely established seem worthy of description and illustration.

Venericardia eutawcolens,

Pl. 2. Fig. 1, 2

Specific characterization.—Size and general form as indicated by the figures and explanations; rather inflated; substance of the shell rather thin, showing on molds of the interior the position of the ribbing; ribs about 28-30 in number, compound, tripartite, the middle part strongest, highest and most crenulate or spinose; interspaces from $\frac{1}{2}$ to $\frac{1}{3}$ the width of the compound ribs; ribs about the umbonal region simple, finely crenulate, distinctly so just in front of the lunule which is small, deeply sunken.

The ornamentation, or ribbing of this form differs materially from that of any other species of the genus with which we are acquainted. In the usual *alticostata* type of ribbing there is a central keel superimposed upon a broader foundation, giving a terraced structure on each side. Here there are actually three raised, radiating, nodose, strong riblets upon each rib, the center one being somewhat the strongest, however. This reminds one of the exterior markings on some *Pectens*.

The ribs in Conrad's *V. blandingi* are of the very carinate "*wilcoxensis*" type and not of the trilinear style of our new form. The "side-ribs" in *perantiqua* as figured by Whitfield in Mon. U.

S. G. S., No. 9, pl. 30 lack the prominence of those in the South Carolina form and are not nodose while the interspaces are as wide as the ribs.

Type.—C. U. Museum.

Locality.—Eutaw Springs and Centre Hill, S. C. ; specimens are casts in a hard creamy-white limestone.

Metis ? eutawensis, n. sp.,

Pl. 2. Fig. 3.

Characterization.—A quadrangular cast of the interior of a Tellinoid shell measuring 45x37x8 mm., showing no signs of lateral teeth, with but faint indication of a posterior flexure, but with traces of a profound pallial sinus ; interiorly with low ridges radiating before and behind the anterior muscular scar, accurately delimiting the same, while the posterior muscular scar is not sharply defined ; post-umbonal slope clearly defined but not marked off by a sharply carinated ridge.

Type.—Paleont. Museum, Cornell Univ.

Locality.—Eutaw Springs, S. C. Expedition of '98.

Crassatellites eutawcolens, n. sp.,

Pl. 2. Fig. 4.

Characterization.—Internal cast of a medium sized (39x30x10 mm), sharply angular and elevated form, quite different from any known Eocene *Crassatellites* above the basal beds of the Gulf States ; marginal crenulation fine on the posterior, very coarse postero-basally and disappearing anteriorly ; basal margin rather full or sub-angular medially ; umbonal ridge sharply defined ; exterior apparently with well-defined, even, concentric lirations.

Type.—Paleont. Museum, Cornell Univ.

Locality.—Eutaw Springs. Cornell Expedition of '98.

Meiocardia carolinæ, n. sp.,

Pl. 2. Figs. 5, 6.

Characterization.—Size and general appearance as indicated by the figures ; inflated, with a well-defined post-umbonal slope, on which, about two-fifths way from the ridge to the ligamental margin there is a well-defined radiating ridge ; traces of interior radiating lines sometimes present ; marginal impressions indicating a fairly thick shell ; concentric undulations noticeable

basally and posteriorly.

Small casts of these species are common at Wilmington and Eutaw Springs. Sometimes at the former locality specimens the size of fig. 5 are found. An impression of the exterior of what appears to be the same species is in our collections, labelled Neuse River, 16-17 miles above Newbern, N. C. This shows, besides rather regular concentric undulations posteriorly, fine concentric lining. These lines are almost rectilinear medially but curve up rather abruptly anteriorly and posteriorly. This reminds one of Dall's *M. agassizi*, a recent West Indian species.

Types.—Paleont. Museum, Cornell Univ.

Localities.—Eutaw Springs, S. C. ; Wilmington, N. C., and Neuse River above Newbern.

Pecten trentensis, n. sp.,

Pl. 2. Figs. 8, 9.

Specific characterization.—Form and size as indicated by the illustrations ; ribs highly variable in number, size and amount of ornamentation ; generally bifid and generally ornamented by highly raised, scale-like or imbricating concentric lines ; costation showing a strong tendency towards a tri- or quinque-costate pattern, especially in the left valve ; central rib largest of the three or five major ones.

The general appearance of this shell is so different from anything we have heretofore found in the Eocene of this part of the United States that, owing to a lack of well-known species from the same locality, its horizon must at present be considered as doubtful.

Type and specimens figured.—Deposited by G. D. Harris in Museum at Cornell Univ.

Locality.—Found in light, marly bed, right bank of Trent river, near the water's edge, about six miles below Polloksville, North Carolina, in the so-called Trent formation. The latter has been referred to the upper Claiborne or Jackson Eocene.

Pecten elixatus Con. ?

Pl. 2. Figs. 10, 11.

A few fragments of another species of *Pecten* were found

among the representatives of the species just described, which seem at first sight to belong to *P. poulsoni*. But upon direct comparison of the two the left valve of *poulsoni* is never flat and in some instances decidedly gibbous, whereas in this species the fragment figured indicated a plane, or even concave valve. Again, the ribs on the posterior ear are much more numerous in this North Carolina species and the posterior cardinal angle less than 90° . The tops of the ribs in *poulsoni* appear broad and tri-partite; in this species, bi-partite. The concentric sculpturing is much the same in both species. However, a large series of these forms may cause them to be finally regarded as one species. If so, it would seem that a considerably greater geologic range should be given to this species than has been admitted heretofore else the horizon on the Trent whence these specimens came is far higher than has been suspected. A rather near relative of *poulsoni* has been described by Dall as *Burnsii* from the Chipola marls of Florida. (Trans. Wag. III, 1898, p. 720, pl. 34, fig. 8.) Conrad's *elixatus* from "near Santee Canal, South Carolina, in white, friable limestone" is generally referred to *poulsoni* Mort.

***Pecchiolia dalliana*, n. sp.,**

Pl. 2. Fig. 7.

Specific characterization.—Size and general appearance as indicated by the figure; extremely inflated and generally Exogyroid surface marked by numerous radiating small ribs becoming stronger and farther apart as the position of the umbonal ridge is approached; there occasional inter-riblets appear; passing the umbonal ridge the strength of the ribs decreases to the ligamental margin; a radiating channel divides the post-umbonal into two nearly equal portions; concentric markings consist of numerous rather irregular and ill-defined undulations, strongest basally.

This shell is strikingly similar to *P. wemmelensis* Vincent from the "*Sables de Wemmel*" (Bull. Soc. royal Mal. de Belg. vol. 32, 1897, p. xxx) and, since these sands are the equivalent of the Barton Beds of England one instinctively thinks of the aid, small though it may be, that this form may render us in correlating the upper Eocene deposits on either side of the Atlantic.

Our specimen is mainly in form of a cast, from the City Quarry near Wilmington, N. C., found among many other beautiful molluscan remains, echinoderms and branchipods.

We take great pleasure in styling this the Dall *Pecchiolia* not only on account of the great and valuable Tertiary work of this author, but especially on account of his early extensive and painstaking work on this branch of Pelecypoda.

Type.—Deposited by Harris in Museum at Cornell.

Meretrix angelinae n. sp.,

Pl. 2. Figs. 12, 13.

Specific characterization.—Shell large (65x54x15mm) and oblong, as indicated by the figures; anterior somewhat extended as in *Cornelli* but posterior not with broad circular sweep of concentric lines, but with more or less of a rectilinear truncation; pallial sinus small, V-shaped; anterior muscular scar sharply defined, posterior scarcely visible; a few obscure radiating ridges internally and a few radiating lines.

This large species, (figures somewhat less than life size,) is found in the state of casts and impressions in sandy ironstone fragments gathered by A. C. Veatch along the Angelina River, Angelina County, Texas, 2 miles above Marion.

It seems very different from anything with which we are acquainted in the lower Eocene beds, and is here associated with an abundance of *Anomia*, (also *Plicatula filameatosa*, *Ostrea* var. *vermilla*, *Sphærella bulla* and *anteproducta*,) reminding one strongly of the St. Maurice beds of Louisiana; also a small, smooth *Pecten*; but most telling among its associates are *Haminea grandis*, *Pleuratoma creno-strinata* Heilp., of Jackson age; but one of the most abundant species is *Rimella* cf. *texana*, a St. Maurice form. A *Fusoficula* and an unusually large *Tornatina* are among the undescribed associates. (See below.)

Types.—Deposited in the Paleont. Mus., Cornell Univ.

Tornatina angelinae, n. sp.,

Pl. 2. Fig. 14.

Specific characterization.—Form and general appearance as figured; shell thin, smooth, marked only by indistinct longitud-

inal lines of growth which swing forward in the medial portion of the volution giving the margin of the lip a broad, curved form ; margin of the lip somewhat in-flected ; spire very short, of scarcely over two volutions, suture broadly channelled.

This is a large, imposing type of *Tornatina*, measuring in adult specimens 23mm. in length by 13 in diameter. It is found abundantly in the material above described in association with *Meretrix angelinæ*.

Fusoficula angelinensis, n. sp.,

Pl. 2. Fig. 15.

Specific characterization.—More or less long—*Scaphella*-shaped as illustrated ; differing from all other members known to the writer in its elongate form, with no traces of a shouldering above on the body whorl and no traces of tri-carination medially ; revolving lines stronger than the longitudinal, and showing generally a secondary intermediate lesser series.

Found associated with the above on Angelina River, Tex.

REMARKS ON SOME NEW SPECIES FROM TRINIDAD

BY

KATHERINE VAN WINKLE

The material from which the following species were obtained was collected in 1912, on the island of Trinidad by A. C. Veatch under the auspices of the General Asphalt Company of Philadelphia, Miss Carlotta J. Maury being the Paleontologist. The stratigraphy and paleontology was subsequently worked up by Dr. Maury and published in the Journal of the Academy of Sciences of Philadelphia. A few forms not reported seem interesting and worthy of description.

Thanks are due to Professor Harris for the use of the material from both Virginia and Trinidad and for suggestions in the determinations.

The descriptions of the localities where these forms were collected have been taken from the notes of Miss Maury, that were found with the material.

Genus **ASTARTE** Sowerby

Astarte mauriana, n. sp.,

Pl. 3. Fig. 1.

Description.—Size and shape of shell as indicated by the figures; inequilateral, beaks situated about one-third the length of the shell from the anterior end; a very slight, umbonal ridge extends from the beaks part way down the posterior end of the shell causing a faint, noticeable concavity behind; surface ornamented with wide, heavy concentric ribs, interspaces half the width of the ribs. In the situation of the beaks and in general outline this form varies from a typical *Astarte* and recalls the form of *Pitaria* or allied Venerid genera. Longitude of shell 15mm;

altitude 12mm.

Type and specimens figured.—Pal. Museum., Cornell Univ.
Geologic horizon.—Midway Eocene.

Locality.—"Bed No. 2, Soldado Rock, Gulf of Paria, Trinidad."

Collected by A. C. Veatch in 1912, then of the General Asphalt Company of Philadelphia.

Astarte trinidadensis, n. sp.,

Pl. 3. Figs. 2, 3.

Description.—Size and shape of the shell as indicated by the figures; subequilateral; lower portion of the anterior and posterior ends similarly rounded, blunt in outline; surface decorated with six prominent, narrow, raised concentric ribs, the interspaces very wide, two or three times the width of the ribs. This species differs from *A. mauriana*, n. sp., in the beaks being more central, in a more rounded posterior end, lower in form and in the character and number of the concentric ribs. In *A. trinidadensis* the ribs are more pronounced, much narrower and fewer in number. There are less than twice the number of ribs in this species than in our other form of *Astarte*. Longitude of shell 15mm; altitude 10mm.

Type and specimens figured.—Pal. Museum, Cornell Univ.

Geological horizon.—Midway Eocene.

Locality.—"Bed No. 2, Soldado Rock, Gulf of Paria, Trinidad." Collected by A. C. Veatch in 1912, then of the General Asphalt Company of Philadelphia.

Genus **MARCIA** H. and A. Adams

Marcia pariænsis, n. sp.,

Pl. 3 Figs. 4, 5.

Description.—Size and shape of shell as indicated by the figures; a slight umbonal ridge extends from the beaks to the posterior, ventral margin; surface ornamented with prominent, concentric lamellæ which are much more pronounced and heavier on the anterior and central portion of the valve, decreasing in size from the posterior umbonal ridge backward. Longitude of shell 16mm; altitude 13mm.

Type and specimens figured.—Pal. Museum, Cornell Univ.

Geologic horizon.—Midway Eocene.

Locality.—"Bed No. 2, Soldado Rock, Gulf of Paria, Trinidad."

Collected by A. C. Veatch in 1912, then of the General Asphalt Company of Philadelphia.

Genus **MACROCALLISTA** Meek

Macrocallista? *veatchi*, n. sp..

Pl. 3. Figs. 6, 7.

Description.—Size and shape of shell as indicated by the figures; high compared with the size of the shell; beaks situated nearly centrally, swollen; surface sculpture consists of numerous, moderate in size, radiating ribs with very narrow interspaces, less than one-half the width of the ribs. The first cardinal of the right valve differs from the type of *Macrocallista* in being a very large, heavy tooth, the posterior ligamental groove in this form is not as deep or external as in most species of *Macrocallista*. These characteristics, with the shortness of form probably makes the species of sectional rank. Longitude of shell 22mm: altitude 19mm.

Type and specimens figured.—Pal. Museum, Cornell Univ.

Geological horizon.—Midway Eocene.

Locality.—"Bed No. 2, Soldado Rock, Gulf of Paria, Trinidad."

Collected by A. C. Veatch in 1912, then of the General Asphalt Company of Philadelphia.

Genus **LEVIFUSUS** Conrad

Levifusus *whitei*, n. sp.,

Pl. 3. Fig. 11.

Description.—Size and shape as indicated by the figures; whorls five or six; on the specimen we have, the last volutions of the spire are broken, but the spire would probably measure half the length of the body whorl; suture distinct, appressed; a series of large, sharply rounded nodes occur on the upper portion of the body whorl about one-fourth the distance from the suture to

the anterior end ; upper volutions similarly decorated with nodes which begin at the sutural line and become obscure just above the central portion of the whorls ; surface of the shell smooth ; below the nodulation of the body whorl, with the aid of the microscope, very fine revolving striæ may be detected.

Type and specimens figured.—Pal. Museum, Cornell Univ.

Geologic horizon.—Midway Eocene.

Locality.—"Bed No. 2, Soldado Rock, Gulf of Paria, Trinidad."

Collected by A. C. Veatch in 1912, then of the General Asphalt Company of Philadelphia.

Genus **PSEUDOLIVA** Swainson

Pseudoliva soldadoensis, n. sp.,

Pl. 3. Fig. 10.

Description.—Size and shape of shell as indicated by the figures ; whorl, six, convex, with a slight shoulder ; last three volutions of the spire, narrow and very pointed ; the shoulder of the body whorl extends at about an angle of thirty degrees and bears numerous small nodes. Much of the surface of the body whorl of our specimen has been destroyed but on the remaining portion which is about a third of the whole whorl there are twelve nodes ; on the whorls of the spire a groove extends irregularly around the shoulder ; traces of nodes can be seen along the front of this groove. The surface of the shell is otherwise smooth except for lines of growth. This species is related to *Pseudoliva* sp. that Professor Harris has figured from the Midway of Alabama, pl. 9, fig. 22, *Bulletins of American Paleontology*, vol. I, no. 4. They both have the small nodes on the shoulder of the body whorl and the upper portion of the spire, similarly shaped. *P. soldadoensis* n. sp. is a more robust form, the upper portions of the whorls are more convex and the nodes are more numerous. Altitude of the shell 33 mm ; diameter 20 mm ; altitude of spire 7 mm ; angle of spire 83°.

Type and specimens figured.—Pal. Museum, Cornell Univ.

Geological horizon.—Midway Eocene.

Locality.—"Bed No. 2, Soldado Rock, Gulf of Paria, Trinidad."

Collected by A. C. Veatch in 1912, then of the General Asphalt Company of Philadelphia.

Genus **ERATO** Risso

Erato vaughani (Maury)

Pl. 3 Figs. 8, 9.

Cypræa vaughani Maury, Jour. Acad. Nat. Sci. Phila., 2nd ser. vol. XV, 1912, p. 87, pl. XI, fig. 14, 15.

Original description.—"Shell small; pyriform, tapering to a pointed base; inflated; surface smooth except for faint lines of growth, which are most apparent on the earlier whorls; spire distinct, acute, showing two small volutions, with a clearly defined suture; aperture rather wide, but so filled with the indurated matrix that all plications are concealed; outer lip much thickened, inner lip with a rather fine callus.

Height of shell 24, greatest width 17, thickness 14 mm.

Remarks: This particular *Cypræa* is wholly unlike anything described from the lower Eocene horizons."

We have been able to obtain, since Miss Maury described this species, three additional specimens and remove the rock matrix so as to reveal the character of the aperture, the smooth columella and crenulated outer lip.

Size and shape of shell as indicated by the figures; whorls five; a deep posterior sulcus, the margin of the outer lip heightened or extending over the whorls of the spire as in many young *Cypræa*; the very characteristic feature of this species is the elongate, *Pyrula*-like base or canal.

Specimens figured.—Pal. Museum, Cornell Univ.

Geological Horizon.—Midway Eocene.

Locality.—"Bed No. 2, Soldado Rock, Gulf of Paria, Trinidad."

PLEUROPHOPSIS, new genus

Description.—The form known only from casts; large, elongate, inequilateral, beaks situated about one-fourth the length of the shell from the anterior end; surface sculpture consists of heavy, concentric lines of growth; two cardinal teeth in the left valve, the posterior cardinal very large, the anterior slender;

right valve bears two cardinals of subequal size ; anterior adductor impression very large and high with a wide, deep groove behind, which would correspond on the shell to a deep adductor scar and ridge between it and the umbonal area ; pedal muscle scar conspicuous and situated dorsal to the adductor, posterior muscle impression and pallial line very indistinct, no sinus noticeable.

From the dental and muscular structure this form seems to be a descendant of the Pre-Tertiary genus *Pleurophorus*.

***Pleuropopsis unioides*, n. sp.,**

Pl. 3. Fig. 12.

Unio sp. Maury, Jour. Acad. Nat. Sci. Phila., 2nd ser. vol. XV, 1912, p. 50, pl. VIII, figs. 18, 19.

Description.—Size and shape as indicated by the figures and explanations ; slight umbonal ridge extends from the beaks and merges into the posterior ventral margin ; surface sculpture consists of rather heavy, concentric lines of growth. Longitude of shell 77 mm ; altitude 33 mm.

Remarks.—This and the following new species from the same locality represent a large collection of casts, the hinge structure of which, for the most part, are but poorly preserved. The fauna is very peculiar and unlike any known. Because of its uniqueness and questionable origin it was thought that the forms should be figured and described as far as possible, thus placing on record the occurrence of such a fauna.

The species just described, in outline and in the occurrence of the heavy muscular impression, resembles a *Unio*. But the presence of clear cut dentition eliminates that genus. We have also in the collection a species of *Leda*, *Nucula* and *Modiolaria* as well as a number of marine gastropoda.

Type and specimens figured.—Pal. Museum, Cornell Univ.

Age.—Probably Middle Tertiary.

Locality.—"One mile west of Godineau River on the shore of the Gulf of Paria, about midway between San Fernando and La Brea, Trinidad."

Collected by A. C. Veatch in 1912, then of the General As-

phalt Company of Philadelphia.

Pleurophopsis unioides var. **fernandensis**, n. sp.,

Pl. 3. Fig. 13, 14.

Description.—Size and shape as indicated by the figures ; umbonal ridge which extends nearly to the posterior, ventral margin well marked in the young ; two very wide, deep furrows extend on the anterior portion of the shell from the area of the beak to the ventral margin ; the groove most anterior extends practically straight to the basal margin, while the second groove extends obliquely toward the posterior end of the shell ; where this furrow merges into the base, the margin of the shell forms an indentation, from here the anterior portion is drawn out at about an angle of 30 degrees to the dorsal margin ; this gives the form an aviculoid appearance, this extreme contortion is characteristic of the large, adult specimens, the young show the two anterior furrows but are more moderate in form, showing the shape of the parent species, *P. unioides* ; surface sculpture consists of heavy lines of growth which in the adult become very rugose along the umbonal ridge ; longitude of shell 134 mm ; altitude 55 mm.

Type and specimens figured.—Pal. Museum, Cornell Univ.

Age.—Probably Middle Tertiary.

Locality.—"One mile west of Godineau River on the shore of the Gulf of Paria, about midway between San Fernando and La Brea, Trinidad."

Collected by A. C. Veatch in 1912, then of the General Asphalt Company of Philadelphia.

THYASIRA Leach

Thyasira adoccasa, n. sp.,

Pl. 3. Fig. 15, 16.

Unio sp. Maury, Jour. Acad. Nat. Sci. Phila., 2nd ser. vol. XV, 1912, p. 50, pl. IX, fig. 1.

Description.—Shell attaining a very great size ; shape as indicated by the figures, in the young form the shape is more quadrate, the posterior end less attenuated ; in the young and intermediate stages a very characteristic, strong fold or flexure extends from the beaks to the posterior margin ; this groove which is so marked in the early and medium stages is greatly reduced in

the adult.

Our collection of this species consists of a series of four specimens, which range in length, 22 mm, 87 mm, 118 mm and 123 mm respectively ; were it not for this series showing the gradation in size and umbonal ridge one would not be inclined to identify the two extremes as the same species.

This form resemble *Thyasira bisecta* (Conrad) from the Miocene of the West Coast of North America. The Pacific species, however, does not reach such a ponderous size. No species of this genus has been reported from the East Coast American Tertiaries. This would seem to give our fauna a closer affinity with the West Coast forms of the Middle Tertiary Stages.

Types.—Pal. Museum, Cornell Univ.

Age.—Probably Middle Tertiary.

Locality.—"One mile west of Godineau River, on the shore of the Gulf of Paria, about midway between San Fernando and La Brea, Trinidad."

Collected by A. C. Veatch in 1912, then of the General Asphalt Company of Philadelphia.

SOLARIELLA S. Wood

Solariella godineauensis, n. sp., Pl. 3. Figs. 17, 18.

Description.—Size and shape of shell as indicated by the figures ; body whorl ornamented with three, pronounced, equally distant carinae ; all of the whorls are carinated but with each succeeding volution the carination is diminished by one ; as the carinae extend to the apex they become more and more crenulated ; in the concave area between the shoulder and the suture is a smaller keel very strongly crenulated, producing a nodose condition ; these are caused by the intersection of the keels with prominent, radiating ribs which extend from the suture to the shoulder carina, traces of these ribs may be seen on the lower portion of the body whorl ; they have interspaces of about three times the width of a rib ; aperture wide and flaring, this flare extending conspicuously out from the basal margin ; two or three additional revolving ridges extend on the body whorl below the

last carina. Altitude of shell 8 mm ; greatest diameter 9 mm.

Types and specimens figured.— Paleont. Mus., Cornell Univ.

Age.—Probably Middle Tertiary.

Locality.—"One mile west of Godineau River on the shore of the Gulf of Paria about Paria, about midway between San Fernando and La Brea, Trinidad."

Collected by A. C. Veatch in 1912, then of the General Asphalt Company of Philadelphia.

EXPLANATION OF PLATES.

Plate I.

	Page
Fig. 1. <i>Anapteris regalis</i> , n. sp. Left valve. Lon.* 17 mm. Virginia	7
2. <i>Anapteris regalis</i> , n. sp. Another specimen. Left valve. Lon. 11 mm. Virginia.....	7
3. <i>Anapteris regalis</i> , n. sp. Hinge line showing its curvature.	7
4. <i>Leda cælatella</i> , n. sp. Right valve. Lon. 13 mm. Virginia	6
5. <i>Leda cælatella</i> , n. sp. Another specimen. Left valve. Lon. 16 mm. Virginia.....	6
6. <i>Leda cæolata</i> Conrad, left valve. Lon. 21 mm. Claiborne sands. Alabama.....	6
7. <i>Solarium ianthinæ</i> , n. sp. Cast. Altitude 36 mm. Virginia	8
8. <i>Solarium ianthinæ</i> , n. sp. Showing ornamentation.....	8
9. <i>Solarium ianthinæ</i> , n. sp. Surface markings restored.....	8
10. <i>Ficus affinis</i> , n. sp. Alt. 17 mm. Virginia.....	8
10a. <i>Ficus affinis</i> , n. sp. Showing ornamentation.....	8
11. <i>Adeorbis novi-castrî</i> , n. sp. Diam. 2 mm. Virginia.....	9
12. <i>Adeorbis novi-castrî</i> , n. sp. Showing base.....	9
13. <i>Adeorbis virginienensis</i> , n. sp. Diam. 4 mm. Virginia.....	9

* Greatest dimension.

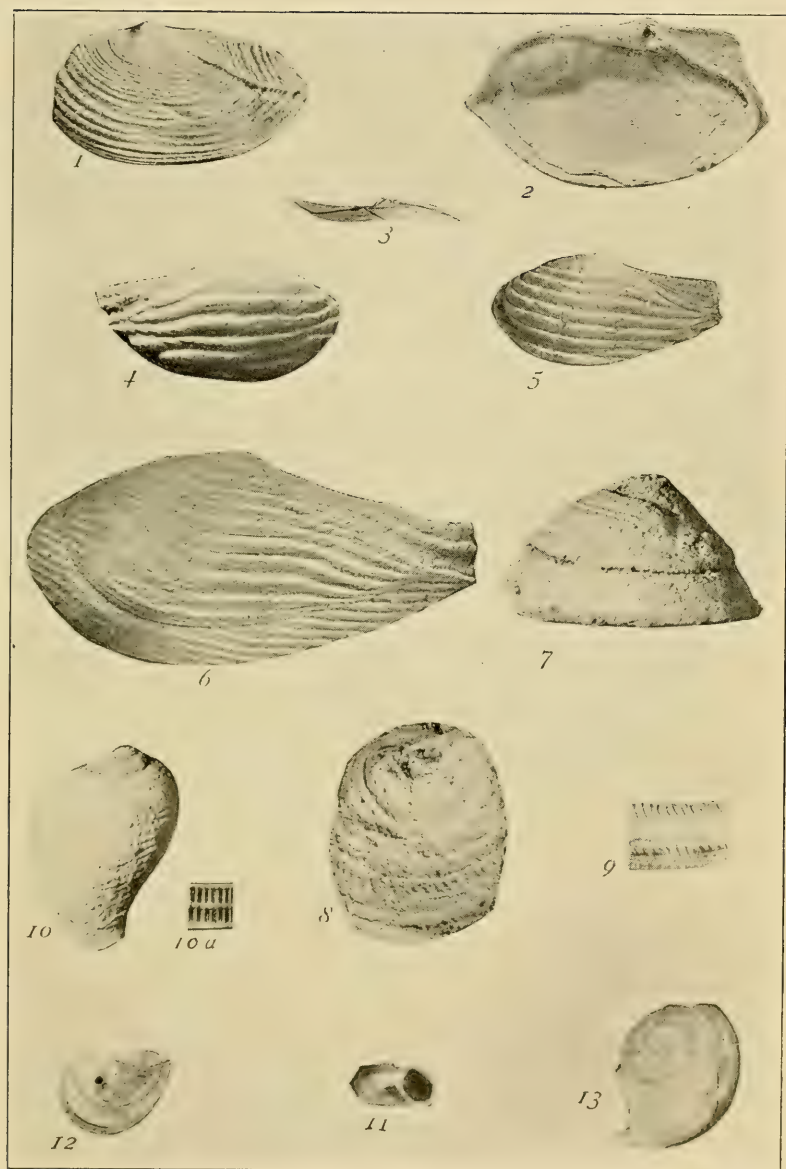


Plate 2.

	Page
Fig. 1. <i>Venericardia eutawcolens</i> , n. sp. Left valve. Lon. 26 mm. South Carolina.....	13
2. <i>Venericardia eutawcolens</i> , enlarged, showing character of the ribs.....	13
3. <i>Metis? eutawensis</i> , n. sp. Cast of interior. Lon. 45 mm. South Carolina	14
4. <i>Crassatellites eutawcolens</i> , n. sp. Internal cast. Lon. 39 mm South Carolina	14
5. <i>Meiocardia carolinæ</i> , n. sp. Cast. Lon. 27 mm.....	14
6. <i>Meiocardia carolinæ</i> , n. sp. Cast of smaller specimen. Eu- taw Springs.....	14
7. <i>Pecchiolia dalliana</i> , n. sp. (30x25x12 mm.) Wilmington, N. C.....	16
8. <i>Pecten trentensis</i> , n. sp. Lon. 28 mm. North Carolina.....	15
9. <i>Pecten trentensis</i> , n. sp. Lon. 26 mm. North Carolina	15
10. <i>Pecten elixatus</i> Con.? Showing ribbing. Lon. 15 mm. North Carolina.	15
11. <i>Pecten elixatus</i> Con.? Fragment showing ear. Lon. 8 mm North Carolina.....	15
12. <i>Meretrix angelinæ</i> , n. sp. Lon. 65 mm. Texas.....	17
13. <i>Meretrix angelinæ</i> , n. sp. Lon. 54 mm. Texas.....	17
14. <i>Tornatina angelinæ</i> , n. sp. Alt. 23 mm. Texas.....	17
15. <i>Fusoficula angelinensis</i> , n. sp. Alt. 22 mm. Texas.....	18

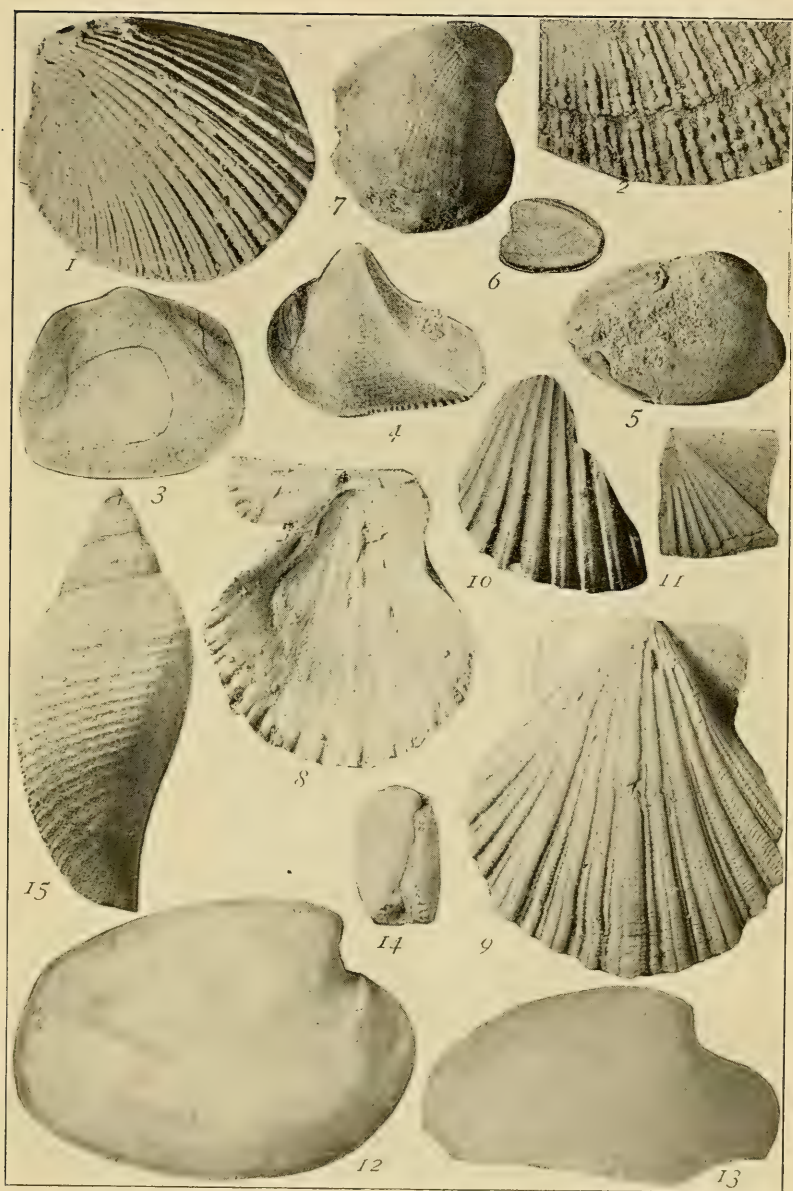
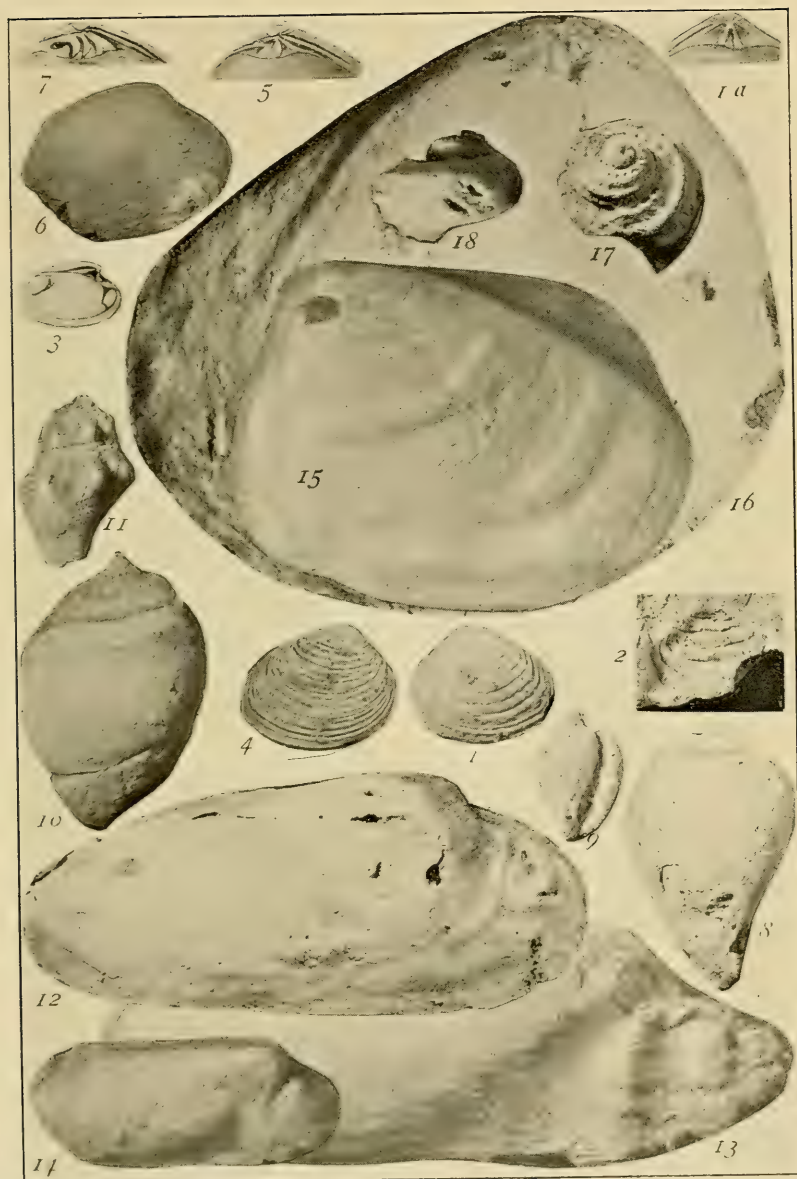


Plate 3

	Page
Fig. 1. <i>Astarte mauriana</i> , n. sp. Left valve. Lon. 15 mm. Trin- idad.....	19
1 a. <i>Astarte mauriana</i> . Showing hinge.....	19
2. <i>Astarte trinidadensis</i> , n. sp. Cast of right valve. Lon. 15 mm. Trinidad.....	20
3. <i>Astarte trinidadensis</i> . Another specimen showing hinge...	20
4. <i>Marcia pariaënsis</i> , n. sp. Right valve. Lon. 16 mm.....	20
5. <i>Marcia pariaënsis</i> , n. sp. Showing hinge.....	20
6. <i>Macrocallista ? veatchi</i> , n. sp. Right valve. Lon. 22 mm Trinidad	20
7. <i>Macrocallista ? veatchi</i> , n. sp Showing hinge.....	21
8. <i>Erato vauhani</i> (Maury). Alt. 30 mm. Trinidad.....	23
9. <i>Erato vauhani</i> (Maury). Showing aperture. Alt. 8 mm	23
10. <i>Pseudoliva soldadoensis</i> , n. sp. Alt. 33 mm. Trinidad.....	22
11. <i>Levifusus whitei</i> , n. sp, Trinidad.....	21
12. <i>Pleurophopsis unioides</i> , n. gen. n. sp. Cast of right valve. Lon. 77 mm. Trinidad.....	24
13. <i>Pleurophopsis unioides fernandensis</i> , n. var. Adult. Cast of right valve. Lon. 134 mm.....	25
14. <i>Pleurophopsis unioides fernandensis</i> , n. var. Young. Lon. 53 mm. Trinidad.. ..	25
15. <i>Thyasira adoccasa</i> , n. sp. Cast of left valve. Lon. 87 mm. Trinidad	25
16. <i>Thyasira adoccasa</i> , n. sp. Adult. Cast of right valve. Lon. 118 mm.....	25
17. <i>Solariella godineauensis</i> , n. sp. Alt. 8 mm. Trinidad.....	26
18. <i>Solariella godineauensis</i> , n. sp. Another specimen.....	26



JUL 7 1921

**BULLETINS
OF
AMERICAN PALEONTOLOGY**

—————*

Vol. 8

—————*—————

No. 34

**RECENT MOLLUSCS OF THE GULF OF MEXICO AND
PLEISTOCENE AND PLIOCENE SPECIES FROM
THE GULF STATES**

Part I: Pelecypoda

BY

CARLOTTA JOAQUINA MAURY

Dec. 15, 1920

Cornell Univ., Ithaca, N. Y.
U. S. A.
Harris Co.

RECENT MOLLUSCS OF THE GULF OF MEXICO AND PLEISTOCENE AND PLIOCENE SPECIES FROM THE GULF STATES

BY

CARLOTTA JOAQUINA MAURY

INTRODUCTION

While acting as paleontologist on the Louisiana State Geological Survey, some years ago, a great number of deep well fossils were placed in my hands for identification by the Director of the Survey, Professor G. D. Harris.

Many of the well fossils had been collected in the Jennings oil field which was then being actively exploited, and an interesting series was presented to the Survey by Mr. Knapp from his experimental wells in Terrebonne Parish. Mr. Krackie of New Orleans also presented a collection from the Gymnasium Club well in that city. Specimens from Alabama wells were loaned by Mr. Aldrich.

Professor Harris made extensive collections of recent shells at points along the coast from Cedar Keys, Florida, to Galveston, Texas, and he and Mr. Whitney collected a large number of Pleistocene shells at Grand Chénier, Louisiana, and at the New Orleans pumping station. These recent and Pleistocene shells were also identified by the writer and used for comparative study with the well fossils.

It is rather singular that while the molluscan faunas of our Atlantic and Pacific coasts have been extensively studied, the Gulf Coast fauna has been comparatively neglected. For this reason it seems as though an annotated catalogue, embracing the results of our work, and that of Dr. Dall, Messrs. Hilgard, Singey, Aldrich, Mitchell, Vanatta and others, might be of value.

The field covered by the following catalogue includes the recent littoral species from Tampa, western Florida, to Galveston and Corpus Christi, Texas; the recent deep water and abyssal species dredged by the Steamer Blake in the Gulf of Mexico, south to the Straits of Florida and the Channel of Yucatan; the Pleistocene, Pliocene, and a few Miocene species from Gulf State wells; the Pleistocene species of Grand Chénier; the marine Pliocene species of North Creek, western Florida, and the curious brackish water Pliocene species of Alexandria, Louisiana, and of Burkeville, Texas, which are closely related to those of the Satilla River, Georgia.

MOLLUSCA
CLASS PELECYPODA
ORDER PRIONODESMACEA

Genus **SOLEMYA** Lamarck

occidentalis Deshayes

Solenomya occidentalis Desh., Jour. de Conch., vol. 7, p. 186, pl. 7, fig. 6, 1858.

occidentalis Dall, Bull. 24, U. S. Geol. Surv., p. 274, 1885; Bull. 37, U. S. Nat. Mus. p. 46, 1889.

Distribution.—Gulf of Mexico to Guadeloupe. Recent. Shallow water.

Gulf Coast.—Western Florida (Dall).

Genus **NUCULA** Lamarck

proxima Say

obliqua Say, Amer. Jour. Sci., vol. 2, p. 40, 1820. (Not *obliqua* Lamarck, 1819).

proxima Say, Jour. Acad. Nat. Sci. Phila., vol. 2, p. 270, 1822; Tuomey and Holmes, Pleioc. Fos. S. C., p. 53, pl. 17, figs. 7-9, 1855; Holmes, Post-Plio. Fos. S. C. p. 17, pl. 3, fig. 6, 1860; Dall, Bull. 37, U. S. Nat. Mus., p. 42, pl. 16, fig. 4, 1889; Trans. Wag. Inst. Sci. 3, pt. 4, p. 574, 1898; Clark, Pleistocene of Maryland, Md. Geol. Surv., p. 207, pl. 65, figs. 1-4, 1906.

Distribution and range.—Typical from North Carolina to Florida, 2-100 fathoms; variety, *trunculus* Dall, northern, from Long Island to Nova Scotia. Miocene to Recent.

Gulf Coast.—Cedar Keys, Florida.

ægeensis Jeffreys, Proc. Zool. Soc., p. 581, 1879.

ægeensis Dall, Bull. Mus. Comp. Zool. Harvard Coll., vol. 12, p. 246, 1886; Bull. 37, U. S. Nat. Mus., p. 42, 1889.

Distribution and range.—Southward to Trinidad and in the Mediterranean Sea. 5 to 464 fathoms. Recent.

Gulf Coast.—Western Florida in shallow water (Dall).

crenulata A. Adams, Proc. Zool. Soc., p. 52. 1860.

crenulata Dall, Bull. Mus. Comp. Zool. Harvard Coll., vol. 9, p. 123, 1881; *Idem*, vol. 12, p. 247, 1886; Bull. 37, U. S. Nat. Mus., p. 42, pl. 7, fig. 2, 1889.

culebrensis Smith. Challenger Rept. Lamell., p. 228, pl. 18, figs. 11, 11 a, 1885.

Distribution.—Hatteras to Barbados, 30 to 382 fathoms.

Gulf Coast.—Western Florida, 20 miles off shore (Dall).

cymella Dall, Bull. Mus. Comp. Zool., vol. 12, p. 247, 1886.

cymella Dall, Bull. 37, U. S. Nat. Mus., p. 42, 1889.

Distribution.—Florida Straits to Yucatan. In deep water, 205 to 1100 fathoms. Yucatan Strait, dredged in 540 fms. (Dall).

verrilli Dall

trigona Verrill, Trans. Conn. Acad., vol. 6, p. 438, 1885.

verrilli Dall, Bull. Comp. Zool. Harvard Coll., vol. 12, p. 248, 1886; Bull. 37, U. S. Nat. Mus., p. 42, 1889.

Distribution.—Rhode Island to Yucatan. Recent. Abyssal, 430 to 1605 fms. Gulf of Mexico. Texas region (Dall).

chipolana Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 575, pl. 32, fig. 10, 1898.

chipolana Aldrich, Manuscript Ala. well fossils.

Distribution.—Miocene of the Chipola River marls and lower Alum Bluff bed, Florida; Bascom No. 1 well, Mobile, Ala-

bama, at the Oak Grove horizon, 1550-1556 feet. Aldrich's collection.

Genus **LEDA** Schumacher

acuta Conrad

Nucula acuta Con., Amer. Mar. Conch., p. 32, pl. 6, fig. 1, 1831. (Not of Sowerby, 1837).

Leda cuneata Sowerby, P. Z. S., p. 198, 1832.

Nucula acuta Conrad, Fos. Medial Tertiary, p. 57, pl. 30, fig. 2, 1845; Holmes, Post-Plio. Fos. S. C., p. 16, pl. 3, fig. 7, 1860.

Leda jamaicensis Orb., Moll. Cuba, 2, p. 262, pl. 26, figs. 27-29, 1846; Dall, Bull. Comp. Zool., vol. 9, p. 124, 1881.

unca Gould, Proc. Boston Soc. Nat. Hist., 8, p. 282, 1862; Verrill, Trans. Conn. Acad., vol. 5, p. 572, pl. 58, fig. 41, 1882.

acuta Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, 1878; Dall, Bull. 37, U. S. Nat. Mus., p. 44, pl. 7, figs. 3, 8, pl. 45, fig. 15, pl. 64, fig. 140, 1889; Trans. Wag. Inst. Sci., 3, pt. 4, p. 592, 1898; Vanatta, Proc. Acad. Nat. Sci., Phila., vol. 55, p. 756, 1903; Clark, Pleistocene of Maryland, Md. Geol. Surv., p. 209, 1906.

acuta Dall, Proc. U. S. Nat. Mus., vol. 37, p. 250, 1910.

Remarks.—This species, which is ancient and widely distributed, varies greatly in concentric sculpture. Conrad, in the original description, speaks of the concentric striæ as prominent and Dall states that in some instances they may even become coarse ribs or waves. Other forms are nearly smooth. This is generally so with our material from the Gulf border.

Distribution.—East coast, Rhode Island to the Antilles in 30 to 155 fathoms. West Coast, California to Valparaiso, Chile. Miocene to Recent.

Gulf Coast localities.—Recent: Indian Pass, St. Joseph's Bay,

Crooked Island, Florida ; Point au Fer, Cameron, Louisiana ; Galveston.

Pleistocene : Grand Chênier, New Orleans Gymnasium well at 1200 feet, Lake Borgne borings, Knapp's wells, Terrebonne Parish, No. 1 at 1600-1700, No. 2 at 1050-1190, 1519-1542, 1552-1632, No. 3 at 570-700, 1043, 1150-1200, 1200-1300 feet, Bayou City Oil Co.'s well, Texas, at 600 feet.

Miocene : Bascom No. 2 well, near Mobile, Alabama, at 1800 feet.

concentrica Say, Jour. Acad. Nat. Sci., Phila., 1st. ser., vol. 4, p. 141, pl. 10, fig. 6, 1824. (Not *Nucula concentrica* Fischer, Fos. Moscow, 1843).

Nucula eborea Conrad, Proc. Acad. Nat. Sci. Phila., vol. 3, p. 24, pl. 1, fig. 4, 1846.

Leda eborea Dall, Proc. U. S. Nat. Mus., vol. 6, p. 341, 1883.

concentrica Dall, Bull. 37, U. S. Nat. Mus., p. 44, 1889 ; Singley, Fourth Ann. Rept. Geol. Surv. Texas, p. 326, 1892 ; Harris, Bull. Am. Pal., vol. 1, No. 3, p. 89, 1895 ; Dall, Trans. Wag. Inst. Sci., vol. 3, pt. 4, p. 588, 1898 ; Mitchell, List Marine Shells Texas.

Distribution.—Texas to Trinidad. Upper Miocene to Recent. Gulf Coast.—Recent : Cedar Keys, Galveston, Corpus Christi. Tampa was Conrad's type locality of *eborea*.

Pleistocene : Gulf Coast (Dall). Upper Miocene : Galveston artesian well ranging from the surface to 2650 feet (Harris).

dodona Dall, Trans. Wag. Inst. Sci., vol. 3, pt. 4, p. 589, pl. 32, fig. 6, 1898.

Closely related to the recent *Leda acuta* Conrad, but differing in details of sculpture.

Distribution.—Miocene, Oak Grove, Santa Rosa County, Florida ; Bascom No. 1 well, near Mobile, Alabama, at 1500-1556 feet, Oak Grove horizon. Aldrich's collection.

solidula E. A. Smith, Challenger Rept., Lam., p. 233, pl. 19, figs. 6, 6a, 1886.

solidula Dall, Bull. Mus. Comp. Zool., vol. 12, p. 250, 1886 ; Bull. 37, U. S. Nat. Mus., p. 44, 1889.

Distribution.—Deep water, 640 to 1002 fms. Dredged in southern limits of Gulf of Mexico at Yucatan Strait and at Cape San Antonio (*S. S. Blake*). Type locality off Pernambuco, Brazil, in 675 fms. (*S. S. Challenger*).

subæquilatera Jeffreys, Proc. Zool. Soc., p. 579, pl. 56, fig. 3, 1879.

subæquilatera Dall, Bull. Mus. Comp. Zool., vol. 12, p. 252, 1886.

Yoldia subequilatera Dall, Bull. 37, U. S. Nat. Mus., p. 44, 1889.

Leda subequilatera Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 582, 1898.

Distribution.—Norway to Grenada Island in 92 to 1731 fms. Gulf of Mexico, Western Florida region (Dall).

Genus **YOLDIA** Møller

Recent *Yoldias* in the Gulf of Mexico are all restricted to deep water, as they seek cold temperatures,—the genus being typical of Arctic and Antarctic Seas.

hebes Smith

Leda hebes E. A. Smith, Challenger Rept. Lam., p. 234, pl. 19, fig. 7, 1885.

hebes Dall, Bull. Mus. Comp. Zool., vol. 12, p. 252, 1886.

Yoldia hebes Dall, Bull. 37, U. S. Nat. Mus., p. 44, 1889.

This resembles the North Pacific and circumboreal species, *Yoldia intermedia* Sars (*Portlandia intermedia* Sars, Moll. Reg. Arct. Norv.; p. 38, Tab. 4, fig. 9, 1878), but is distinct.

Distribution.—Western Florida to Culebra Island, in 196-805 fms. Off Cedar Keys, Florida (Dall).

liorhina Dall, Bull. Mus. Comp. Zool., vol. 9, p. 127, 1881; *Idem*, vol. 12, p. 248, pl. 9, figs. 1, 1 a, 1886; Bull. 37, U. S. Nat. Mus., p. 44, pl. 9, figs. 1, 1 a, 1889.

Distribution.—Gulf of Mexico to Barbados in 100 to 1568 fms. Western Florida region (Dall).

solenoides Dall, Mus. Comp. Zool., vol. 9, p. 127, 1881; *Idem*, vol. 12, p. 248, pl. 9, figs. 2, 2 a, 1886; Bull. 37, U. S. Nat. Mus., p. 44, pl. 9, figs. 2, 2 a, 1889.

Distribution.—Gulf of Mexico, dredged, Lat. 28°, W. Long. 89°, 118 fms. *S. S. Blake* (Dall).

frater Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 596, pl. 32, fig. 1, 1898.

Distribution.—Miocene of the Chipola marl and Oak Grove sands, Florida. Miocene, Chipola horizon, of the Mobile Oil Company's No. 2 well, Bascom race track, Mobile, Alabama, at a depth of 1241 feet.

Genus **TINDARIA** Bellardi

cytherea Dall

Nucula cytherea Dall, Bull. Mus. Comp. Zool., vol. 9, p. 123, 1881.

Malletia veneriformis E. A. Smith, Chall. Rept., p. 246, pl. 20, figs. 9, 9 a, 1885.

Malletia (Tindaria) cytherea Dall, Bull. Mus. Comp. Zool., vol. 12, p. 254, pl. 8, figs. 1, 1 a, 1886; Bull. 37, U. S. Nat. Mus., p. 44, pl. 8, figs. 1, 1 a, 1889; Trans. Wag. Inst. Sci., vol. 3, pt. 4, p. 582, 1898.

Distribution.—Florida Straits to St. Vincent in 200 to 724 fms. Gulf of Mexico off Cape San Antonio, 413-424 fms. Yucatan Strait, 640 fms. Gulf, Lat. 28°, W. Lon. 87°, 724 fms., temperature 40° F.

amabilis Dall

Malletia (Tindaria) amabilis Dall, Bull. 37, U. S. Nat. Mus. p. 44, pl. 40, fig. 8, 1889.

Tindaria amabilis Dall, Trans. Wagner Inst., vol. 3, pt. 4, p. 582, 1898.

Distribution.—Off Cedar Keys and south to Tobago, 169 to 940 fms.

pusio Philippi

Nucula pusio Philippi, Moll. Sic., vol. 2, p. 47, pl. 15, fig. 5, 1844.

Leda pusio Jeffreys, Proc. Zool. Soc., p. 578, 1879.

Leda (Saturnia) pusio Dall, Bull. Mus. Comp. Zool., vol. 12, p. 253, 1886; Bull. 37, U. S. Nat. Mus., p. 44, 1889.

Tindaria (Neilonella) pusio Dall, Trans. Wagner Inst., vol. 3, pt. 4, p. 582, 1898.

Remarks.—This species formed the type of Seguenza's section *Saturnia*, 1876. Not *Saturnia* of Schrank, 1802. Dall (1898) includes Seguenza's section in *Neilonella* Dall, 1881.

Distribution.—North Atlantic and Gulf of Mexico, deep water, 856 to 1591 fms. Pliocene to Recent.

Genus **LIMOPSIS** Sasso

Limopsis aurita Brocchi

Arca aurita Brocchi, Conch. Foss. Subapp., vol. 2, p. 485, Tab. 11, fig. 9.

Limopsis aurita Jeffreys, Proc. Zool. Soc., p. 585, 1879; Dall Bull. Mus. Comp. Zool., vol. 9, p. 118, 1881; *Idem*, vol. 12, p. 237, 1886; Bull. 37, U. S. Nat. Mus., p. 42, 1889.

Distribution.—Norway to Grenada, 21 to 1582 fms. Gulf of Mexico, west of Florida, in 31 fms. Average temperature 55° F. Miocene to Recent.

cristata Jeffreys, Ann. and Mag. Nat. Hist., p. 434, 1876.

cristata Dall, Bull. Mus. Comp. Zool., vol. 9, p. 119, 1881; *Idem*, vol. 12, p. 237, 1886; Bull. 37, U. S. Nat. Mus., p. 42, 1889.

Distribution.—Norway to Yucatan, 85 to 1095 fms. Gulf of Mexico, Yucatan Strait, 640 fms. (*S. S. Blake*)

minuta Philippi

Pectunculus minutus Philippi, En. Moll. Sic., vol. 1, p. 63, Tab. 5, fig. 3, vol. 2, p. 45.

minuta Dall, Bull. Mus. Comp. Zool., vol. 9, p. 119, 1881; *Idem*, vol. 12, p. 236, 1886; Bull. 37, U. S. Nat. Mus., p. 42, 1889.

Distribution.—Norway to Barbados, 30 to 2221 fms. Miocene to Recent. Gulf of Mexico west of Florida, 30 fms.

tenella Jeffreys, Ann. Mag. Nat. Hist., p. 433, 1876.

tenella Dall, B. M. C. Z., vol. 9, p. 118, 1881; *Idem*, vol. 12, p. 236, 1886; Bull. 37, U. S. Nat. Mus., p. 42, 1889.

Distribution.—North Atlantic to Cuba, 197 to 2033 fms. Gulf of Mexico west of Florida (*S. S. Blake*).

Genus **ARCA** Linnæus

occidentalis Philippi, Abbild. u. Besch., vol. 3, p. 14, pl. 17 b, figs. 4 a-c, 1847.

zebra, Swainson, (in part), Zool. Ill., No. 26, pl. 118, 1831.

noæ Dall, Bull. 37, U. S. Nat. Mus., p. 40, 1889. Not *A. noæ* Linnæus of the Mediterranean fauna.

occidentalis Sheldon, Palæont. Americana, vol. 1, p. 8, pl. 1, figs. 8 to 11, 1916.

occidentalis Maury, Bull. Amer. Pal., No. 29, p. 163, pl. 29, fig. 3, 1917.

Distribution.—Hatteras to Yucatan, 1 to 20 fms. Miocene to Recent.

Gulf Coast.—Living on west coast Florida. Pliocene: Caloosahatchie marls, Fla.

umbonata Lamarck, An. s. Vert., vol. 6, p. 37, 1819.

imbricata Dall, Bull. 37, U. S. Nat. Mus., p. 40, 1889; Mitchell, List Texas Shells, Not *A. imbricata* of Bruguière.

umbonata Dall, Trans. Wagner, Inst., vol. 3, pt. 4, pp. 620, 659, 1898 ; *Idem*, pt. 5, pl. 38, figs. 4, 4 a, 1900 ; Sheldon, Palæont. Americana, vol. 1, p. 8, pl. 1, figs. 12 to 17, 1916 ; Maury, Bull. 29, Amer. Pal., p. 163, pl. 30, fig. 11, 1917 ; New York Acad. Sci., Porto Rico Survey, vol. 3, pt. 1, p. 6, 1920.

Distribution.—Hatteras to Brazil. Oligocene (of Porto Rico and of Tampa, Florida) to Recent. Gulf Coast.—Living : west Florida and Galveston. Miocene : Chipola River, Calhoun Co., Florida. Oligocene : Tampa Bay silex beds.

Subgenus **BARBATIA** Gray

barbata Linnæus

Arca barbata Linnæus, Syst. Nat., p. 693, 1758.

barbata, H. and A. Adams, Gen. Rec. Moll., vol. 2, p. 534, pl. 124, figs. 4, 4 a, 4 b, 1858 ; Dall, Bull. 37, U. S. Nat. Mus., p. 40, 1889 ; Trans. Wagner Inst. Sci., vol. 3, pt. 4, pp. 614, 615, 659, 1898 ; Sheldon, Palæontographica Americana, vol. 1, p. 12, pl. 2, figs. 4 to 7, 1916.

Distribution.—Hatteras to Barbados and the Mediterranean, in 2 to 15 fms. Gulf Coast west Florida and Texas. (Dall). A common European fossil.

(**Calloarca**) **candida** Gmelin

Arca candida Gmelin, Syst. Nat., vol. 6, p. 3311, 1792.

jamaicensis Gmelin, Syst. Nat., vol. 6, p. 3312, 1792 ; Dall, (*as Noëtia*), Bull. 37, U. S. Nat. Mus., p. 40, 1889. Not a valid species.

candida Dall, Bull. 37, U. S. Nat. Mus., p. 40, 1889 ; Trans. Wagner Inst., vol. 3, pt. 4, p. 626, 1898 ; Dall and Simpson, Bull. U. S. Fish Comm., vol. 20, pt. 1, p. 460, 1901 ; Sheldon Palæont. Americana, vol. 1, p. 16, pl. 3, figs. 11, 12, 1916.

Distribution.—Recent : Hatteras to Brazil, tide water to 5 fms. Perhaps also African. Gulf coast.—Recent : West Flori-

da. Miocene : Chipola River marl and Chipola horizon, Alum Bluff, Fla.

(*Acar*) *reticulata* Gmelin

Arca reticulata Gmelin, Syst. Nat., vol. 6, p. 3311, 1792.

squamosa, *domingensis* and *clathrata* Lamarck, An. s. Vert., vol. 6, pp. 45, 40, 46, 1819.

gradata Broderip and Sowerby, Zool. Jour., vol. 4, p. 365, 1829.

divaricata Sowerby, Proc. Zool. Soc., p. 18, 1833 ; Reeve, Conch. Icon., *Arca*, pl. 16, fig. 108, 1844.

(*Byssarca*) *reticulata* Dall, Bull. 37, U. S. Nat. Mus., p. 42, 1889.

(*Acar*) *reticulata* Dall, Trans. Wagner Inst., vol. 3, pt. 4, p. 629, 1898 : Sheldon, Palæont. Americana, vol. 1, p. 20, pl. 4, figs. 8 to 12, 1916 ; Dall, Checklist. Moll. Northwest Coast, p. 14, 1916 ; Maury, Bull. 29, Amer. Pal., p. 166, pl. 30; fig. 16, 1917 ; N. Y. Acad. Sci., Porto Rico Surv., vol. 3, pt. 1, p. 7, 1920.

Distribution.—Hatteras to Panama, also in the Mediterranean; Pacific, California to Ecuador, tidewater to 287 fms. Jacksonian Eocene to Recent. Gulf coast.—Recent : west Florida and Texas ; Pliocene : Caloosahatchie River, Florida. Miocene : Chipola River, Calhoun Co., Fla. Upper Oligocene : Tampa silex beds.

(*Fossularca*) *adamsi* Shuttleworth

Arca cœlata Conrad, Fos. Med. Tert., p. 61, pl. 32, fig. 2, 1845. Not of Reeve, 1844.

(*Acar*) *Adamsii* Shuttleworth, in Smith Zool. Jour. Linn. Soc., vol. 20, p. 499, pl. 30, figs. 6, 6 a, 1888.

(*Byssarca*) *Adamsi* Dall, Bull. 37, U. S. Nat. Mus., p. 42, 1889.

(*Fossularca*) *Adamsi* Dall, Trans. Wagner Inst., vol. 3, pt. 4, p. 629, 1898 ; Vaughan, Carnegie Inst. Publ. 133, p. 171, 1910 ; Deussen U. S. G. S. Water-Supply Paper, 335,

p. 77, 1914, (as *Arca Adamsi*); Sheldon, Paleont. Amer., vol. 1, p. 22, pl. 4, figs. 16-18, pl. 5, fig. 1, 1916.

Distribution.—Hatteras to Fernando Noronha, 1 to 116 fms. Miocene to Recent. Gulf coast.—Recent: west Florida. Pliocene: Caloosahatchie, Shell and Alligator Creeks, Fla. (Dall). Miocene: Chipola River and Oak Grove, Fla.; Gilbert well No. 10, Bateson, Hardin Co., Texas, at 323 feet (?). Miocene horizon (Deussen).

adamsi conradiana Dall, Bull. Mus. Comp. Zool., vol. 12, p. 243, 1886; Bull. 37, U. S. Nat. Mus., p. 42, 1889; Proc. U. S. Nat. Mus., vol. 24, p. 508, pl. 31, fig. 1, 1902; Sheldon, Palæont. Amer., vol. 1, p. 22, 1916. A smaller, squarer form than typical.

Distribution.—Hatteras to West Florida, 25 to 52 fms. Cedar Keys, Fla.

(*Cucullaria*) *paserula* Sheldon

Macrodon aperula Dall, Bull. Mus. Comp. Zool., vol. 9, p. 120, 1881; *Idem*, vol. 12, p. 244, p. 8, figs. 4, 4 a, 1886; Bull. 37, U. S. Nat. Mus., p. 42, pl. 8, figs. 4, 4 a, 1889. Not *Arca asperula* Deshayes, An. s. Vert., vol. 1, p. 883, pl. 66, figs. 4-6, 1860.

Bentharca asperula Verrill and Bush, Proc. U. S. Nat. Mus., vol. 20, p. 842, 1898.

(*Cucullaria*) *asperula* Dall, Trans. Wagner Inst., vol. 3, pt. 4, p. 659, 1898.

(*Cucullaria*) *paserula* Sheldon, Palæont. Amer., vol. 1, p. 24, pl. 5, figs. 8, 9, 1916.

Distribution.—Fernandina to Yucatan. Abyssal, 310 to 1568 fms. Dredged by S. S. Blake in Gulf of Mexico, bottom temperature 40° F. Also young shell, doubtful, off Cape San Antonio.

Subgenus **NOETIA** Gray**Noetia ponderosa** Say

Arca ponderosa Say, Jour. Acad. Nat. Sci. Phila., 1st. ser., vol. 2, p. 267, 1822.

contraria Reeve, Conch. Icon., *Arca*, pl. 8, fig. 55, 1844.

elegans Philippi, Zeitschr. Mal., p. 92, 1847. Not *elegans* of Perry, 1811; Rømer, 1836; d'Orbigny, 1844; Wood, 1846; nor of de Kominck.

ponderosa Holmes, Post-Pleiocene Fos. S. Car., p. 21, pl. 4, figs. 4, 4 a, 1860; Hilgard, House of Rep. Ex. Doc., vol. 1, pt. 2, p. 887, 1878; Singley, Fourth Ann. Rept. Geol. Surv. Texas, p. 325, 1892.

(*Noëtia*) *ponderosa* Dall, Bull. 37, U. S. Nat. Mus., p. 40, 1889; Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 633, 1898; Vanatta, Proc. Acad. Nat. Sci. Phila., vol. 55, p. 756, 1903; Clark, Maryland Geol. Surv., Pleistocene, p. 205, pl. 64, figs. 1-6, 1906; Sheldon, Palæont. Amer., vol. 1, p. 28, pl. 6, figs. 6-10, 1916.

Distribution.—Cape Cod to Yucatan. Pliocene to Recent. Gulf Coast.—Recent: Ft. Barranca, Cedar Keys, Indian Pass, St. Joseph's Bay, Crooked Island, Florida; Horn Island, Mississippi; Point au Fer, Louisiana; Galveston, Corpus Christi, Texas.

Pleistocene: Grand Chênier, New Orleans pumping station No. 7, New Orleans artesian well of 1856 at 480 and 560 feet (Hilgard), Lake Borgne borings; Knapp's wells, Terrebonne Parish, No. 2, at 1519-1542, 1632-1726, 1719; 1842, No. 3 at 670, 1579-1618, 1700, Crowley well No. 4, Jennings, at 1663-1670 feet.

Upper Miocene: variety *carolinensis* Conrad, Galveston artesian well at 2552-2871 feet (Harris).

Subgenus **SCAPHARCA** Gray**(Scapharca) secticostata** Reeve

Arca secticostata Reeve, Conch. Icon., *Arca*, No. 38, pl. 6, 1844.

Anomalocardia Floridiana Conrad, Amer. Jour. Conch., vol. 5, p. 108, pl. 13, fig. 2, 1869.

lienosa Dall, Bull. 37, U. S. Nat. Mus., p. 40, 1889. Not *lienosa* Say which is fossil only.

secticostata Dall, Tran. Wagner Inst. Sci., vol. 3, pt. 4, p. 636, 1898; Vanatta, Proc. Acad. Nat. Sci. Phila., vol. 55, p. 756, 1903; Sheldon, Palæont. Amer., vol. 1, p. 36, pl. 8, figs. 3, 4, 5, 1916.

lienosa var. *floridana* Mitchell, List Texas Shells.

Remarks; This comparatively rare shell has been confused with its ancestral type, *Arca lienosa* of the Miocene, first described by Say.

Distribution.—Hatteras to Trinidad. Pleistocene to Recent. Gulf coast.—Recent: St. Joseph's Bay and Crooked Island, West Florida; Long Key, Gulf of Mexico; Galveston, Texas. Pleistocene: North Creek, Little Sarasota Bay, Fla.

(Scapharca) santarosana Dall, Trans. Wag. Inst. Sci., vol. 3, pt. 4, p. 641, pl. 31, figs. 2, 10, 1898.

santarosana Maury, Bull. Amer. Pal., vol. 3, p. 375, 1902; Sheldon, Palæont. Amer., vol. 1, p. 38, pl. 9, figs. 1, 2, 3, 1916.

Distribution.—Miocene. Chipola River marl, Calhoun Co., and the Oak Grove sands, Santa Rosa Co., Fla. Also the lower bed, Alum Bluff, Fla. Bacom No. 1 well, near Mobile, Alabama at 1500-1556 feet, Oak Grove horizon; Bacom No. 2 well at 1241 and 1600 feet. (Well specimens in Aldrich's collection).

(*Scapharca*) *transversa* Say

Arca transversa Say, Jour. Acad. Nat. Sci., Phila., 1st. ser., vol. 2, p. 269, 1822.

transversa Conrad, Fos. Tert. Form., p. 15, pl. 1, fig. 2, 1832; Tuomey and Holmes, Pleioc. Fos. S. C., p. 42, pl. 15, figs. 6, 7, 1856; Holmes, Post-Plio. Fos. S. C., p. 21, pl. 4, figs. 5, 5 a; Gould, Inv. Mass., Binney's Ed., p. 148, fig. 465 a, 1870; Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, 1878; Singley, Fourth Ann. Rept. Geol. Surv. Texas, p. 325, 1892; Dall, Trans. Wag. Inst. Sci., vol. 3, pt. 4, p. 645, 1898; Vanatta, Proc. Acad. Nat. Sci., Phila., vol. 55, p. 756, 1903; Clark, Pleistocene of Maryland, Md. Geol. Surv., p. 206, pl. 64, figs. 7-10, 1906; Vaughan, in Matson, 2d Ann. Rept. Fla. Geol. Surv., p. 149, 1909; Dall, in Deussen, U. S. G. S. Water Supply Paper 335, p. 77, 1914; Dall, in Matson U. S. G. S. Profess. Paper, 98-L., p. 177, 1916; Sheldon, Palæont. Amer., vol. 1, p. 47, pl. 11, figs. 4, 5, 6, 1916.

Remarks.—This shell is very abundant all along the Gulf coast, and is the commonest *Arca* in the adjacent wells. The specimens from the wells are often extremely small, young forms. A Miocene variety, *busana* Harris, was found in the Galveston well in 1895. It is more elongated and less inflated than the typical form of this species.

Distribution.—Cape Cod to Vera Cruz in 2 to 10 fms. Miocene to Recent. Gulf coast.—Recent: Ft. Barranca, Indian Pass, Crooked Island, Florida; Horn Island, Mississippi; Point au Fer, Cameron, Louisiana; Galveston, Corpus Christi, Texas; Gulf of Campeachy.

Pleistocene: New Orleans artesian well of 1856 at 41, 66, 79, 146, 233, 480, 570 feet; Lake Borgne borings, New Orleans pumping station No. 7; New Orleans Gymnasium well at 1200 feet, Lydia, Grand Chênier; Knapp's wells, Terrebonne Parish, No. 1 at 1600-1700, 2000-2150, 2250-2450, No. 2 at 1050-1190, 1190-1430, 1434-1519, 1542-1632, 1632-1726, 1731-1739, 1780-1790, 1791-1842, No. 3 at 570-

700, 700-780, 790-830, 880-900, 1040-1043, 1150-1200, 1200-1300, 1330-1375, 1400-1440, 1443-1470, 1470-1480, 1500-1525, 1579-1618, 1796-1839, 1865-2029 feet; Weiss No. 1 well, Saratoga, Texas, (depth not recorded), Teel No. 1, Saratoga, Texas, at 940 feet. Well at Fort Morgan, Alabama at 87 and 100-112 feet. Orient Station, Hillsboro Co., Fla.; North Creek, Fla. Pliocene: Myakka River, West Fla. Pleistocene to Upper Miocene: Galveston artesian well from the surface to 2920 feet (Harris). Miocene: Gilbert well, No. 10, Bateson, Hardin Co., Texas, at 323 feet (Dall).

(Scapharca) auriculata Lamarck

Arca auriculata Lamarck, An. s. Vert., vol. 6, p. 43, 1819.

auriculata Reeve, Conch. Icon., *Arca*, No. 35, pl. 6, 1844.

(*Scapharca*) *auriculata* Dall, Bull. 37, U. S. Nat. Mus., p. 40, 1889; Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 649, 1898; Sheldon, Palæont. Amer., vol. 1, p. 50, pl. 11, fig. 19, 1916; Maury, Bull. 30, Amer. Pal., p. 175, pl. 28, fig. 3, 1917.

Distribution.—Key West to Martinique, 15 to 40 fms. Miocene to Recent in the Antilles. Gulf coast.—Recent: Texas (Dall).

(Cunearca) incongrua Say

Arca incongrua Say, Jour. Acad. Nat. Sci. Phila., vol. 2, p. 268, 1822.

incongrua Tuomey and Holmes, Pleioc. Fos. S. C., p. 45, pl. 16, figs. 5, 6, 1856; Holmes, Post-Plio. Fos. S. C., p. 19, pl. 4, figs. 1, 1a, 1860; Dall, Bull. 37, U. S. Nat. Mus., p. 40, 1889; Singley, Fourth Ann. Rept. Geol. Surv. Texas, p. 325, 1892; Harris, Bull. Amer. Pal., vol. 1, No. 3, pp. 87, 88, 1895; Dall, Trans. Wag. Inst. Sci., 3, pt. 4, p. 635, 1898; Vanatta, Proc. Acad. Nat. Sci. Phila., vol. 55, p. 756, 1903; Sheldon, Palæont. Amer., vol. 1, p. 59, pl. 14, figs. 4 to 7, 1916.

Distribution.—North Carolina to Texas, and the closely related form, *S. brasiliiana* Lamarck, south to Sao Paulo, Bra-

zil. Upper Miocene to Recent. Gulf coast.—Recent: Calhoun County, Florida; Horn Island, Mississippi; Cameron, Point au Fer, Louisiana; Galveston, Corpus Christi, Texas.

Pleistocene: New Orleans pumping station No. 7, Grand Chénier, Knapp's wells, Terrebonne Parish, No. 1 at 2000-2150 (?), No. 2 at 1434-1519, No. 3 at 570-700, Beaumont Petroleum and Liquid Fuel Co.'s well No. 1, Saratoga, Texas, at 705 feet; Weiss No. 1, Saratoga, (depth not recorded). Upper Miocene: Galveston artesian well at 2433-2920 feet (Harris).

(*Cunearca*) *chemnitzii* Philippi

Arca Chemnitzii Philippi, Zeitschr. für Malakozoologie, vol. 8, p. 50, 1851.

(*Noëtia*) *Orbigny* (Kobelt) Dall, Bull. 37, U. S. Nat. Mus., p. 40, 1889.

(*Cunearca*) *Chemnitzii* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, pp. 636, 659, 1898; Sheldon, Palæont. Amer., vol. 1, p. 60, pl. 15, figs. 3, 4, 1916.

Distribution.—Texas and West Florida to St. Thomas (Dall).

(*Argina*) *campechensis* Gmelin

Arca campechensis Gmelin, Syst. Nat., vol. 6, p. 3312, 1792.
campechensis Dillwyn, Descr. Cat. Rec. Shells, vol. 1, p. 238, 1817.

pexata Say, Jour. Acad. Nat. Sci., Phila., 2, p. 268, 1822.

americana Gray, Wood's Index Test. Suppl., pl. 2, *Arca*, fig. 1, 1828; Reeve, Conch. Icon., *Arca*, fig. 21, 1844; Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, 1878; Holmes, Post-Plio. Fos. S. C., p. 19, pl. 4, figs. 2, 2 a, 1860; Dall, Bull. 37, U. S. Nat. Mus. p. 40, 1889; Singley, Fourth Ann. Rept. Geol. Surv. Texas, p. 325, 1892.
pexata Gould, Inv. Mass., Binney's Ed., p. 147, fig. 456, 1870; Hilgard, loc. cit., p. 887, 1878; Dall, Bull. 37, U. S. Nat. Mus., p. 40, 1889; Singley, Fourth Ann. Rept. Geol. Surv. Texas, p. 325, 1892.

campechensis Dall, Trans. Wag. Inst. Sci., vol. 3, pt: 4, p. 650, 1898 ; Vanatta, Proc. Acad. Nat. Sci. Phila., vol. 55, p. 756, 1903 ; Sheldon, Paleont. Amer., vol. 1, p. 61, pl. 15, figs. 6 to 13, 1916.

Distribution.—Cape Cod to Trinidad. Upper Miocene (?) to Recent. Gulf Coast.—St. Joseph's Bay and Indian Pass, both in Calhoun Co., Florida ; Mobile, Alabama ; Horn Island, Mississippi ; Cameron, Point au Fer, Chandeleurs, Louisiana ; Galveston, Corpus Christi, Texas.

Pleistocene : Grand Chênier, New Orleans pumping station No. 7, New Orleans artesian well of 1856, Lake Borgne borings, New Orleans Gymnasium well at 1200 feet, Knapp's well, Terrebonne Parish, No. 1 at 2000-2150, 2250-2450, No. 2 at 1800, No. 3 at 300-400, 880-900 feet. Upper Miocene : (?) Jennings-Heywood Oil Syndicate's well No. 29, Jennings, Louisiana, at 1960-1980 feet.

labiata Sowerby, var.

Arca labiata (Sowerby) Harris, Fourth Ann. Rept. Geol. Surv. Texas, p. 121, 1893.

Arca (small *Limopsis*-like) Harris, *loc. cit.* (very young).

Arca labiata (Sby.) var. Harris, Bull. Amer. Pal. 1, No. 3, p. 89, pl. 1, figs. 1, 1 a, 1895.

Distribution.—Upper Miocene of the Galveston artesian well at 2510-2871 feet (Harris).

Remarks.—These well specimens closely resembled the West Coast species *Arca labiata* Sowerby (Proc. Zool. Soc., p. 21, 1833 ; Reeve, Conch. Icon., *Arca*, pl. 1, fig. 7, 1844 ; Dall Proc. U. S. Nat. Mus., vol. 37, p. 253, 1910) which ranges from San Diego, Cal., to Tumbes, Peru, in the recent fauna.

(Bathyarca) glomerula Dall

Arca glomerula Dall, Bull. Mus. Comp. Zool. Harvard Coll., vol. 9, p. 121, 1881.

(*Scapharca*?) *inæquisculpta* E. A. Smith, Chall. Rept. Lam., p. 267, pl. 17, figs. 8 a-8 c, 1885.

glomerula Dall, Bull. Mus. Comp. Zool., vol. 12, p. 241, pl. 8, figs. 9, 9 a, 1886.

(*Byssosarca*) *glomerula* Dall, Bull. 37, U. S. Nat. Mus., p. 42, pl. 8, figs. 9, 9 a, 1889.

(*Bathyarca*) *glomerula* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 659, 1898; Sheldon, Palæont. Amer., vol. 1, p. 64, pl. 16, figs. 4, 5, 1916.

Distribution.—Hatteras to St. Vincent, 100 to 683 fms. Gulf of Mexico, western Florida region. (Dall).

(*Bathyarca*) *pectunculoides* Scacchi

Arca pectunculoides Scacchi, Not. Conch. foss. Gravina, in Ann. Civ. Sicil., vol. 6, p. 82, 1834.

pectunculoides var. *orbiculata* Dall, Bull. Mus. Comp. Zool., vol. 9, p. 121, 1881; *Idem*, vol. 12, p. 240, pl. 8, fig. 5, 1886.

(*Bathyarca*) *pectunculoides* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, pp. 619, 659, 1898; Sheldon, Palæont. Amer., vol. 1, p. 65, pl. 16, figs. 9-11, 1916.

Distribution.—Norway to St. Vincent, 75 to 1568 fms. Variety *orbiculata* dredged by the Blake in Gulf of Mexico.

Genus **GLYCYMERIS** Da Costa

pectinata Gmelin

Arca pectinata Gmelin, Syst. Nat. 6, p. 3313, 1792.

Pectunculus aratus Conrad, Am. Journ. Sci., vol. 41, p. 346, 1841; Fos. Med. Tert., p. 62, pl. 34, fig. 2, 1845; Tuomey and Holmes, Pleio. Fos. S. C., p. 50, pl. 17, fig. 6, 1857.

pectiniformis Orb., Moll. Cuba, vol. 2, p. 313, 1853; (not *pectiniformis* Lamarck).

charlestonensis Holmes, Post-Plio. Fos. S. C., p. 16, pl. 3, fig. 5, 1860.

pectinatus Dall, Bull. 37, U. S. Nat. Mus., p. 42, 1889.

pectinata Dall, Trans. Wag. Inst., vol. 3, pt. 4, p. 612, 1898.

Distribution.—Hatteras to Nicaragua, 2-175 fms. Miocene to Recent. Gulf Coast.—Recent: west Florida, Texas. Pleistocene: Knapp's No. 3 well, Terrebonne Parish, 670, 700-780 feet; New Orleans Gymnasium well 1200 feet. Pliocene: Caloosahatchie, Fla,

subovata Say

Pectunculus subovatus Say, Jour. Acad. Nat. Sci., Phila., 1st Ser., vol. 4, p. 140, pl. 10, fig. 4, 1824; Conrad, Fos. Shells Tert. Formations, p. 17, pl. 2, fig. 3, 1832.

subovata Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 611, 1898; Aldrich, Manuscript.

Remarks.—This species includes the varieties *tuomeyi* and *plagia* Dall.

Distribution.—Vicksburgian Oligocene of Martin, Fla.; Miocene of Virginia, Maryland, and Florida. Bascom No. 1 well, Mobile, 1550-1556 feet, Oak Grove horizon; No. 2 at 1241, 1600 and 1800 feet.

Genus **ATRINA** Gray**rigida** Dillwyn

Pinna rigida Dill., Cat. p. 327, 1817; Reeve, Conch. Icon., *Pinna*, pl. 5, fig. 7, 1858.

seminuda Lam., An. s. Vert., vol. 6, p. 131, 1819. (Not Reeve); Holmes, Post-Plio. Fos. S. C., p. 14, pl. 3, fig. 2, 1860; Singley, Fourth Ann. Rept. Texas Geol. Surv., p. 324, 1892.

muricata, Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 888, 1878; Dall, Bull. U. S. Nat. Mus. No. 37, p. 36, 1889; Singley, *loc. cit.*, p. 324, 1892; and of many American authors but not of Linnæus nor of Reeve.

rigida Dall, Trans. Wagner Inst., vol. 3, pt. 4, p. 663, 1898; Vanatta, Proc. Acad. Nat. Sci., vol. 55, p. 756, 1903.

Distribution.—Hatteras to Central America. Pleistocene to Recent. Gulf Coast.—Recent: Cedar Keys, St. Joseph's Bay (Calhoun Co.), Fla.; Chandeleur Islands, La.; Galveston, Corpus Christi, Matagorda Bay, Mustang and Padre Islands, Texas. Pleistocene: Lake Borgne borings (Hilgard); New Orleans pumping station No. 7.

serrata Sowerby

Pinna serrata Sowerby, Tank. Cat. App., p. 5, 1825; Reeve, Conch. Icon., *Pinna*, 34, fig. 65, 1859.

squamosissima Philippi, Roemer's Texas, p. 454, 1849.

seminuda Reeve, Conch. Icon., *Pinna*, pl. 2, fig. 2, 1858 ;
Dall, Bull. 37, U. S. Nat. Mus., p. 36, 1889. Not *seminuda* Lamarck.

muricata Holmes, Post-Plio. Fos. S. C., p. 15, pl. 3, fig. 3, 1858. Not *muricata* Linnæus.

serrata Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 664, 1898 ; Vanatta, Proc. Acad. Nat. Sci. Phila., vol. 55, p. 756, 1903.

Distribution.—North Carolina to Guadeloupe Isl. Pliocene to Recent. Gulf Coast.—Recent : St. Joseph's Bay, Fla., and Texas. Pleistocene : Tampa Bay, Little Sarastoa Bay, Fla.

Genus **MELINA** Retzius

obliqua Lamarck

Perna obliqua Lamarck, Jour. de Conch., vol. 2, p. 426, Arango, Fauna Mal. Cuba, p. 269, 1878 ; Dall, Bull. 37, U. S. Nat. Mus., p. 36, 1889.

Distribution.—St. Augustine to Guadeloupe. Gulf coast.—West Florida and Texas.

Genus **PTERIA** Scopoli

colymbus Bolten

Pinctada colymbus Bolten, Mus. Boltenian. p. 167, 1798 ; Chemnitz, Conch. Cat., vol. 8, p. 141, pl. 81, fig. 723, 1785. (Chemnitz not binomial).

Avicula atlantica Lam., An. s. Vert., 6, p. 148, 1819, (in part) ; DeKay, Zool. New York, Mollusca, p. 175 ; Holmes, Post-Plio. Fos. S. C., p. 14, pl. 3, fig. 1, 1858 ; Dall, U. S. Nat. Mus. Bull. 37, p. 36, 1889.

hirundo Gmelin, Syst. Nat. p. 3357, 1792 ; Say, Jour. Acad. Nat. Sci. Phila., vol. 2, p. 262, 1822. Not of Bolten.

colymbus Dall, Trans. Wagner Inst. Sci. 3, pt. 4, p. 670, 1898.

columba Mitchell, List Texas Shells.

Distribution.—Hatteras to Venezuela, 10-180 fms. Pliocene to Recent. Gulf coast,—Cedar Keys ; typical and variety *brevicauda*, Texas coast. Pliocene : Caloosahatchie.

vitrea Reeve

Avicula vitrea Reeve, Conch. Icon. *Avicula*, pl. 18, fig. 68, 1857.

nitida Verrill, List Fish Comm. Moll., p. 281, 1884 ; Dall, Bull. 37, U. S. Nat. Mus., p. 36, 1889.

hirundo var. *vitrea* Dall, Trans. Wagner Inst., 3, pt. 4, p. 670, 1898.

Distribution.—Rhode Island to Tortugas, 28 to 192 fms. Pleistocene to Recent. West Florida.

Genus **MARGARITIPHORA** Megerle

placunoides Reeve

Avicula placunoides Reeve, Conch. Icon., *Avicula*, pl. 17, fig. 68.

placunoides List Cameron Shells (Manuscript). Cameron, Louisiana.

radiata Leach

Avicula radiata Leach, Zool. Miscellany, vol. 1, p. 98, pl. 43, 1814.

radiata Dall, Trans. Wagner Inst. Sci., 3, pt. 4, p. 668, 1898.

Pteria radiata Dall and Simpson, Bull. U. S. Fish Comm., vol. 1, p. 463, 1901.

Distribution.—Bermuda to Brazil. Gulf Coast.—Cameron, La., Pass Cabello, Texas.

Genus **OSTREA** Linnæus

virginica Gmelin

virginiana Lister, Historiæ Conch., t. 200, f. 32, 1692. Not binomial.

virginica Gmelin, Syst. Nat., p. 3336, 1792.

borealis Lamarck, An. sans Vert., 6, p. 204, 1819.

virginiana Sowerby, Genera Shells, *Ostrea*, f. 2, 1822 ; Holmes, Post-Plio. Foss. S. Car., p. 9, pl. 2, fig. 9, 1858.

fundata Holmes, *Idem*, p. 11, pl. 2, fig. 10.

virginica Dall, Bull. Bull. 37, U. S. Nat. Mus., p. 32, 1889;
Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 687, 1898;
Clark, Pleistocene of Maryland, Md. Geol. Surv., p. 204,
pls. 41, 42, 43, 1906.

Distribution.—Canada to Mexico and Gulf of California. Miocene to Recent.

Gulf coast.—Recent: Cedar Keys, St. Mark's, Ft. Barranca, Fla.; Belle Isle, Point au Fer, Week's Island, Lake Charles, La.; Port Lavaca, Rockport and Corpus Christi, Texas.

Pleistocene: Grand Chénier; New Orleans pumping station No. 7; New Orleans Gymnasium well at 1200 feet; Knapp's wells in Terrebonne Parish, No. 1 at 1600-1700, No. 2 at 1190-1430, 1434-1519, 1532-1632, 1780-1790, 1791-1842, No. 3 at 570, 700-780, 880-900, 1040-1043, 1150-1200, 1330-1375, 1400-1440, 1443-1470, 1470-1480, 1500-1525, 1579-1618, 1700, 1800 (Oyster bed); Bayou City well, Beaumont, Texas at 600 feet; Weiss No. 1, depth not recorded; Petroleum and Liquid Fuel Co.'s well No. 1, Beaumont, at 705 feet. Orient and West Creek, Fla. Pliocene: Caloosahatchie marl, Fla.

cristata Born

cristata Born, Mus. Vind., p. 112, pl. 7, fig. 3, 1780.

cristata Dall, Bull. 37, U. S. Nat. Mus., p. 32, 1889; Dall and Simpson, Bull. U. S. Fish Comm., vol. 1, p. 464, 1901.

Distribution.—Florida to Martinique. Gulf coast, Tampa.

frons Linnæus

Mytilus frons Linnæus, Syst. Nat., ed. X, p. 704, 1758.

frons Sowerby, Conch. Icon., vol. 18, pl. 19, fig. 41, 1871;
Dall, Bull. 37, U. S. Nat. Mus., p. 32, 1889; Dall and Simpson, Bull. U. S. Fish Comm., vol. 1, p. 464, 1901.

Distribution.—East and west coasts Florida to Barbados.

equestris Say

equestris Say, See Tryon, Amer. Marine Conch., p. 193, 1873-1874; Dall Bull. 37, U. S. Nat. Mus., p. 32, 1889;

Trans. Wagner Inst. Sci., 3, pt. 4, p. 672, 1898.

Distribution.—N. Carolina to Florida. Gulf coast.—Charlotte Harbor, Fla.

Genus **UNIO** Philippon

tetralasmus var. **declivis** Say

declivis Say, Transylvania Jour., vol. 4, p. 527, 1831; Amer. Jour. Conch., vol. 3, pl. 35, 1832.

Var. *declivis* Simpson, Proc. U. S. Nat. Mus., vol. 22, p. 740, 1900.

Distribution.—*U. tetralasmus* and its varieties. inhabits the Lower Mississippi drainage area north to Lat. 40°; Alabama River System and extends west through Texas into Northern Mexico. Pleistocene: pumping station No. 7, New Orleans.

Genus **QUADRULA** Rafinesque

apiculata Say

Unio apiculatus Say, New Harm. Diss., vol. 2, No. 2, p. 309, 1829; Amer. Conch., 6, pl. 52, 1834; Conrad, New Fresh Water Shells, p. 67, 1834; Conrad, Monog. Unionidæ, p. 78, pl. 44, fig. 1, 1836.

nobilis Conrad, Jour. Acad. Nat. Sci., Phila., p. 297, pl. 27, fig. 2 (not 3), 1854.

Quadrula apiculata Simpson, Proc. U. S. Nat. Mus., vol. 22, p. 778, 1900.

Distribution.—Rivers and Lakes, Louisiana to Texas, with *Quadrula trapazoides* Lea in Indian shell heaps, Lake Charles, La. Pleistocene: Knapp's No. 3 well, Terrebonne Parish, 500 ft.

Genus **PECTEN** Müller

phrygium Dall, B. M. C. Z., 12, p. 217, '86; Bull. 37, U. S. N. Mus., p. 34, pl. 40, fig. 1, '89.

Distribution.—Hatteras to Grenada, 50-792 fms. Yucatan Banks, Lat. 23° N., Long. 88° W.

(**Euvola**) **ziczac** Linnæus

ziczac Linn., Syst. Nat., p. 1144.

Pecten ziczac Reeve, Conch. Icon. *Pecten*, pl. 6, fig. 29 ;
Dall, Bull. 37, U. S. N. M., p. 32, '89 ; Trans. Wagner
Inst., 3, pt. 4, p. 694, '98.

Distribution.—Tampa to Guadeloupe.

Subgenus **CHLAMYS** Bolten

exasperatus Sowerby, Thes. Conch., 1, p. 54, pl. 18, f. 183-186,
'43 ; Reeve, Conch. Icon., 8, pl. 2, f. 7, 8, '52 ; Dall,
Bull. 37, U. S. Nat. Mus., p. 34, '89.

fuscopurpureus Conrad, J. A. N. S. Phila., pp. 209, 280, pl.
39, f. 10, '49.

Distribution.—Hatteras to Guadeloupe. Pliocene to Recent.
Gulf of Mexico : Charlotte Harbor, 13 fms, Yucatan
Strait 640 fms., Tampa (type locality of *fuscopurpureus*).
Pliocene : Caloosahatchie.

ornatus Lamarck, An. s. Vert., 6, p. 176, 1819 ; Reeve,
Conch. Icon., 19, f. 68, '53 ; Dall, Bull. 37, U. S. Nat.
Mus., p. 34, '89 ; Trans. Wagner Inst., 3, pt. 4, p. 743,
1898.

Distribution.—N. Carolina to Brazil. Gulf.—Off Cedar Keys,
50 fms.

(**Nodipecten**) **nodosus** Linnæus

Ostrea nodosa Linn., Syst. Nat. ed. X, p. 697, 1758.

Pecten corallinus Chemn. Conch. Cab. 7, p. 306, pl. 64, figs.
609-11, 1784.

fragrosus Conrad, Jour. Acad. Nat. Sci., Phila., 2d Ser. 1,
p. 214, pl. 39, f. 11, 1849.

nodosus Dall, Trans. Wag. Inst. Sci., 3, pt. 4, p. 728, 1898 ;
Mitchell, List Texas Shells ; Maury. Bull. Amer. Pal. No.
29, p. 186, 1917.

Distribution.—Antilles and Gulf of Mexico. Variety *fragro-*
sus, Cedar Keys. Pliocene : Caloosahatchie.

(**Plagioctenium**) **gibbus** Linnæus

Ostrea gibba Linn. Syst. Nat., ed. X, p. 698, 1758. Not of
Born 1780.

Pecten dislocatus Say, Jour. Acad. Nat. Sci., Phila., 2, p.
260, 1822.

purpuratus Conrad, Amer. Marine Conch., p. 10, pl. 2, f. 1, 1831. Not of Lamarck.

dislocatus Holmes, Post-Plio. Fos. S. C., p. 12, pl. 2, f. 12, 1858; Hilgard, House of Rep., Ex. Doc. 1, pt. 2, p. 888, 1878.

irradians var. *dislocatus* Dall, Bull. 37, U. S. Nat. Mus., p. 34, 1889; Singley, Fourth Ann. Rept. Texas Geol. Surv., 324, 1892.

gibbus var. *dislocatus* Dall, Trans. Wagner Inst. Sci., 3, pt. 4, p. 746, 1898; *Idem*, pt. 6, p. 1615, 1903.

Remarks: Linnæus' description of *O. gibba* was based on the drawing of a Jamaican Pecten by Browne (Civil and Nat. Hist. Jamaica, p. 41, pl. 40, fig. 10, 1756). According to Dr. Dall, this is identical with *dislocatus* Say.

Distribution.—Hatteras to Brazil and west coast of Africa. Miocene to Recent. Gulf coast.—Recent: Cedar Keys, Fla.; Matagorda, Corpus Christi, Texas. Pleistocene: Orient and North Creek, Fla.; New Orleans well of 1856 at 235, 480, 546 feet; Lake Borgne borings (?); Knapp's wells, Terrebonne Parish No. 1 at 2000-2150, 2250-2450, No. 3 at 570-700, 1150-1200, 1200-1300, 1330-1375, 1400-1440, 1443-1470, 1500-1525 feet.

(*Plagioctenium*) *gibbus irradians* Lamarck

Pecten irradians Lamarck, An. s. Vert., 6, p. 173, 1819.

concentricus Say, Jour. Acad. Nat. Sci. Phila., p. 259, 1822.

irradians Gould, Binney's Ed. Invert. Mass., p. 199, fig. 496, 1870; Dall, Bull. 37, U. S. Nat. Mus., p. 34, pl. 53, fig. 11, 1889; Singley, Fourth Ann. Rept., Geol. Surv. Texas, p. 324, 1892.

gibbus var. *irradians* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 748, 1898; Vanatta, Proc. Acad. Nat. Sci. Phila., vol. 55, p. 756, 1903.

Distribution.—New Jersey to Texas. Pleistocene to Recent. Gulf coast.—Recent: Tampa, Florida; Horn Island, Miss.; Chandeleurs, La.; Corpus Christi, Galveston, Texas. Pleistocene: North Creek, Manatee Co., Fla.;

New Orleans pumping station No. 7; Knapp's wells, Terrebonne Parish, No. 1 at 1600-1700, 2250-2450, No. 2 at 1434, 1780-1790, 1791-1842, No. 3 at 1700-1712 feet.

Subgenus **PSEUDAMUSIUM** Adams

strigillatum Dall, Bull. 37, U. S. Nat. Mus., p. 34, pl. 42, f. 2, '89.

Distribution.—Fernandina to Cuba, Abyssal, 294 to 1181 fms.

Gulf of Mexico: western Fla. region.

vitreum Gmelin

Pecten vitreus Gmelin, Syst. Nat., 6, 1792; Dall, Bull. 37,

U. S. Nat. Mus., p. 34, pl. 64, fig. 141, 1889.

Distribution.—Arctic Ocean to Patagonia, 50 to 800 fms.

West Florida, deep water.

Genus **AMUSIUM** Bolten

papyraceum Gabb

Pleuromectia papyracea Gabb, Trans. Amer. Phil. Soc., vol.

15, p. 257, 1873.

mortoni Dall, Bull. 37, U. S. Nat. Mus., p. 34, 1889. Not

Pecten mortoni Ravenel 1844.

papyraceum Dall, Trans. Wagner Inst. Sci., 3, pt. 4, pp. 718,

757, 1898, *Idem*, pt. 6, p. 1586, 1903; Maury, Bull. Amer.

Pal., No. 29, p. 190, pl. 26, fig. 22, 1917.

Distribution.—Antilles and Gulf of Mexico. Miocene, Santo

Domingo. Living in deep and shallow water, west Florida.

mortoni Ravenel

Pecten mortoni Ravenel, Proc. Acad. Nat. Sci. Phila., 2, p.

96, 1844; Tuomey and Holmes, Pleio. Foss. S. Car., p.

27, pl. 10, f. 1, 2, '55; Dall, Trans. Wagner Inst., 3, pt.

4, p. 757, '98.

Distribution.—Miocene: Md., Car. and Fla. Pliocene: Ca-

loosahatchie and Shell Creek, Fla.

dalli Smith, Chall. Rept. Lam., p. 308, pl. 22, fig. 7a-c, '86;

Dall, B. M. C. Z., 12, p. 209, pl. 4, f. 1, '86; Bull. 37, U.

S. Nat. Mus., p. 32, pl. 4, f. 1, pl. 40, f. 6, '89.

Distribution.—Bermuda to Barbados, abyssal, 218 to 1591 fms.

Gulf of Mexico, western Fla. region, 860 fms.

(**Propeamusium**) **pourtalesianum** Dall, B. M. C. Z., 12, p. 211, pl. 4, f. 3, pl. 5, f. 12, '86; Bull. 37, U. S. N. Mus., p. 34, pl. 5, f. 12, '89.

Distribution.—Dredged, Cedar Keys to Grenada. Charlotte Harbor at 13 fms. Maximum depth 805. Min. temperature 39° F. Mottled variety=*marmoratum* Dall (B. M. C. Z. 9, p. 117, 1881; Bull. 37, U. S. Nat. Mus., p. 34, pl. 4, f. 3, 1889).

cancellatum Smith, Chall. Rept. Lam., p. 315, pl. 23, f. 8, '86; Dall, B. M. C. Z., 12, p. 213, pl. 5, f. 1, 2, '86.

Distribution.—Charlotte Harbor to St. Vincent, 13-1591 fms. Cape San Antonio and Yucatan Strait.

Genus **PLICATULA** Lamarck

gibbosa Lamarck, Syst. An. s. Vert., p. 132, 1801.

spondyloidea Meuschen, (as *Ostrea*), Mus. Gronov., 1778.

Not Linnæan in nomenclature; Arango, Fauna Mal.

Cuba, p. 271, 1878; Dall, B. M. C. Z., 12, p. 227, 1886;

Vaughan, Publ. 133, Carn. Inst., p. 171, 1910.

ramosa Lamarck, An. s. Vert., p. 184, 1819.

cristata Gabb, Trans. Am. Phil. Soc., vol. 15, p. 247, 1873.

vexillata Guppy, Geol. Mag., vol. 1, p. 444, pl. 17, fig. 7, 1874.

ramosa Dall, Bull. 37, U. S. Nat. Mus., p. 32, '89; Singley, Fourth Ann. Rept. Geol. Surv. Texas, p. 324, '92.

gibbosa Dall, Trans. Wagner Inst. Sci., 3, pt. 4, p. 763, '98;

Vanatta, Proc. Acad. Nat. Sci. Phila., vol. 55, p. 756, '03.

Distribution.—Hatteras to Rio la Plata. Gulf coast.—Ft. Barranca, St. Joseph's Bay, Crooked Island, Florida; Horn Island, Mississippi; Galveston. Pleistocene: New Orleans pumping station No. 7; New Orleans Gymnasium well at 1200 feet; Labelle, West Fla.

Genus **SPONDYLUS** Linnæus

echinatus Martyn, Univ. Conch., 2, fig. 154, 1784.

spathuliferus Lamarck, An. s. Vert., 6, p. 191, 1819; Dall,

Bull. 37, U. S. N. Mus., p. 32, '89.

americanus Lam., An. s. Vert. 6, p. 188, 1819; Reeve, Conch. Icon., pl. 4, fig. 17, '56.

echinatus Dall, Tr. W. I., 3, pt. 4, p. 759, '98.

Distribution.—Hatteras to Brazil. Pleistocene to Recent. West Florida and Texas.

gussoni Costa, Cat. Sist., p. 42, 1829; Philippi, Moll. Sicil., 1, p. 87, pl. 5, f. 16, 1836; Dall, B. M. C. Z., 12, p. 227, '86; Bull. 37, U. S. N. M., p. 32, '89.

Distribution.—Antilles and Mediterranean. Gulf of Mexico, Yucatan Strait, 640 fms. A small, colorless, deep water species.

Genus **LIMA** Bruguière

tenera Sowerby, Thes. Conch., p. 84, No. 2, pl. 21, f. 10, 11, 1847; Dall, Proc. U. S. Nat. Mus., 6, p. 341, '83; Bull. 37, U. S. N. M., p. 36, '89; Tr. W. I., 3, pt. 4, p. 768, 1898.

Distribution.—Florida to Barbados. Pliocene to Recent. Gulf coast.—Cedar Keys. Pliocene: Caloosahatchie.

inflata Lamarck, An. s. Vert., 6, p. 156; Dall, B. M. C. Z., 12, p. 224, '86; Bull. 37, U. S. N. M., p. 36, '89.

fasciata Sowerby, Thes. Conch., 1, p. 85, pl. 21, f. 16, 17. Not *Ostrea fasciata* Linnæus.

Distribution.—Hatteras to Trinidad. Gulf coast.—Cedar Keys, and dredged off west Fla., 19 fms.

lima Linnæus, Syst. Nat. ed. X, p. 699, 1758, (as *Ostrea*); Dall, Tr. W. I., 3, pt. 4, p. 767, '98.

radula Chemnitz, Conch. Cat., 6, p. 349, pl. 68, f. 651, 1784.

squamosa Lamarck, Syst. An. s. Vert., p. 136, 1801; Sowerby, Thes. Conch. 1, p. 84, pl. 21, f. 1, 18; Dall, B. M. C. Z., 12, p. 224, '86; Bull. 37, U. S. N. M., p. 36, '89.

Distribution.—Florida to Brazil and almost world wide. Gulf coast.—West Florida, shallow; Yucatan Strait, 640 fms.

(*Limatula*) *confusa* E. A. Smith, Chall. Rept. Lam., 1886; Dall, B. M. C. Z., 12, p. 226, '86; Bull. 37, U. S. N. M., p. 36, 1889.

ovata Jeffreys, Ann. Mag. Nat. Hist., p. 426, 1876; Dall, B.

M. C. Z., 9, p. 118, '81. Not *ovata* Wood.

Distribution.—North Atlantic to Brazil, 31 to 1450 fms. West Fla., deep water.

Genus **ANOMIA** Linnæus

simplex d'Orbigny, Hist. Pol. y Nat. Isla de Cuba, 2, p. 371, 1845; Atlas, pl. 28, figs. 31-33, 1855; Dall, Bull. 37, U. S. N. M., p. 32, pl. 53, f. 1, 2, '89; Tr. W. I., 3, pt. 4, p. 784, '98; Maury, Bull. 29, Am. Pal., p. 191, '17.

ephippium Conrad, Med. Tert. Fos., p. 75, pl. 43, f. 4, '45; Tuomey and Holmes, Pleio. Fos. S. C., p. 18, pl. 5, fig. 4, '55; Holmes, Post-Pl. Fos. S. C., p. 11, pl. 2, f. 11, '58; Hilgard, House Rep., Ex. Doc. 1, pt. 2, p. 888, '78.

electrica Gould, Inv. Mass., p. 140, '41.

glabra Verrill, Am. Jour. Sci., p. 213, 1872.

Distribution.—Nova Scotia to Martinique. Miocene to Recënt. Gulf coast.—Ft. Barranca, Cedar Keys, &c, Fla.; Horn Isl., Miss.; Point au Fer, Cameron, La.; Galveston, Corpus Christi, &c, Tex. Pleistocene: New Orleans pumping station 7, New Orleans Gymnasium well at 1200 feet; New Orleans artesian well of 1856 at 146, 546, 570 feet; Lake Borgne borings; Knapp's well No. 3, Terrebonne Parish at 1330-1375, 1400-1440, 1443-1470 feet.

floridana Dall, Trans. Wagner Inst., 3, pt. 4, p. 783, pl. 35, f. 7, 1898.

Distribution.—Miocene, Oak Grove, Fla., Mobile, Ala., No. 2 well, 1241 feet. Oak Grove horizon.

Genus **PODODESMUS** Philippi

rudis Broderip

Placunanomia rudis Broderip, Proc. Zool. Soc., p. 2, 1834; Reeve, Conch. Icon., pl. 1, f. 2, 1859; Dall, Bull. 37, U. S. N. M., p. 32, '89.

echinata Brod., *abnormalis* Gray and *harfordi* Reeve.

rudis Gray, P. Z. S., p. 121, 1849; Dall, Trans. Wagner Inst., 3, pt. 4, p. 779, '98.

Distribution.—Antilles to Rio la Plata. Gulf coast.—Cedar Keys, Fla. Chipolan Miocene (?)

Genus **MYTILUS** Linnæus

conradianus d'Orbigny, Prodr. Pal., 3, p. 127, 1852; Dall, Tr. Wagner Inst. 3, pt. 4, p. 787, '98.

incrassatus Conrad, Am. Jour. Sci., 41, p. 347, 1841; Fos. Medial Tert., p. 74, pl. 42, fig. 4, '45; Tuomey and Holmes, Pleioc. Fos. S. C., p. 32, pl. 14, figs. 1, 2, 1857; Harris, Bull. Amer. Pal. 1, No. 3, p. 87, '95. Not *incrassata* Deshayes, 1830.

Mytiloconcha incrassata Conrad, Proc. Acad. Nat. Sci. Phila., for 1862, p. 291.

Distribution.—Miocene of New Jersey, Maryland, the Carolinas, and the Galveston artesian well, Texas, at 2384-2871 feet (Harris).

exustus Linn., Syst. Nat. ed. X, p. 705, 1758; Dall, Bull. 37, U. S. Nat. Mus., p. 38, '89; Singley, Fourth Ann. Rept. Texas Geol. Surv., p. 325, '92; Vanatta, Proc. Acad. Nat. Sci. Phila., vol. 55, p. 756, '03; Mitchell, List Texas Shells.

bidens Linn., Syst., Nat., ed. XII, p. 1157, 1767.

domingensis Lamarck, An. s. Vert., 6, p. 121, 1819; d'Orbigny, Moll. Cuba, 2, p. 328, 1845.

Distribution.—Charleston to Bahia, Brazil. Pliocene to Recent. Gulf coast.—Crooked Isl., Calhoun Co., Fla.; Corpus Christi and Lavaca Bays, Tex. Pliocene: Caloosahatchie and Shell Creek, Fla.

hamatus Say, Jour. Acad. Nat. Sci. Phila., 2, p. 265, 1822; Binney's reprint of Say, pp. 91, 204, pl. 50; Dall, Bull. 37, U. S. N. M., p. 38, '89; Singley, Fourth Ann. Rept. Geol. Surv. Texas, p. 325, '92; Dall, Trans. Wag. Inst. Sci., vol. 3, pt. 4, p. 789, '98; Clark, Pleistocene of Maryland, Md. Geol. Surv., p. 203, pl. 60, figs. 5, 6, 1906.

striatus Barnes, Am. Jour. Sci., 6, p. 364, 1823; Say, Am. Conch., 5, pl. 50, 1832.

carolinensis Conrad, Jour. Acad. Nat. Sci. Phila., 7, p. 244, pl. 20, fig. 6, 1837.

Distribution.—Rhode Island to Costa Rica. Pliocene to Recent. Gulf coast.—Cedar Keys, Fla. ; Point au Fer, Weeks Isl., Cameron, La. ; Galveston, Corpus Christi, Tex. Pleistocene : Knapp's wells, Terrebonne Parish, No. 2, at 1434-1519, 1519-1542, 1632-1726, No. 3 at 570-700 feet. Pliocene : Caloosahatchie.

Genus **MODIOLUS** Lamarck

Modiolus tulipa Lamarck

Modiola tulipa Lam., An. s. Vert., 6, p. 111, 1819 ; Reeve, Conch. Icon., pl. 4, fig. 15, 1857 ; Dall, Bull. 37, U. S. N. M., p. 38, '89 ; Mitchell, List Texas Shells.

tulipa Dall and Simpson, Bull. U. S. Fish Comm., 1, p. 470, 1901 ; Vanatta, Proc. Acad. Nat. Sci., Phila., 55, p. 756, 1903.

Distribution.—N. Carolina to Guadeloupe. Gulf coast.—Calhoun and Franklin Cos., Fla. ; Chandeleurs, La. ; Texas.

(**Amygdalum**) **politus** Verrill and Smith

Modiola polita V. and S., Amer. Jour. Sci., 20, pp. 392, 400, 1880 ; Dall, B. M. C. Z., 12, p. 234, pl. 6, f. 3, '86 ; Bull. 37, U. S. N. M., p. 38, pl. 6, f. 3, pl. 45, f. 12, '89.

luteus Jeffreys, 1880. *Nomen nudum*.

Distribution.—North Atlantic to Grenada, 111-1000 fms. Temperature 45° F. Gulf of Mexico, abyssal. Variety *sagittatus* Dall, 85-196 fms. off Cedar Keys, Fla.

(**Amygdalum**) **papyrius** Conrad

Modiola papyria Conrad, Proc. Acad. Nat. Sci. Phila., vol. 3, p. 24, pl. 1, fig. 8, 1846 ; Dall, Proc. U. S. Nat. Mus., 6, p. 341, '83 ; Bull. 37, U. S. Nat. Mus., p. 38, '89 ; Singley, Fourth Ann. Rept. Texas Survey for '92, p. 325, 1893.

Distribution.—Florida to Texas. Tampa Bay (type locality), Cedar Keys, Fla. ; Corpus Christi and Laguna Madre, Texas.

Note.—For *Modiola lignea* Reeve, see *Modiolaria castanea* Say.

(Gregariella) opifex

Modiola opifex Say, Jour. Acad. Nat. Sci. Phila., 4, p. 369, pl. 19, f. 2, *a-b*, 1825; Philippi, Abbild. u. Besch. n. Conch., 3, *Modiola*, p. 21, t. 2, f. 1; Dall, B. M. C. Z., 12, p. 235, '86; Bull. 37, U. S. N. M., p. 38, '89; Checklist N. W. Coast, p. 18, 1916. *Botulina* Dall, synonym of *Gregariella* Monterosato.

Distribution.—Hatteras to Brazil (Kroyer), 0-52 fms. Also Californian coast. Gulf of Mexico, Yucatan Strait, 640 fathoms. (accidental, Dall). This very beautiful species weaves nests of byssal silk.

(Brachydontes) demissus Dillwyn, Cat. Rec. Shells, 1, p. 314, 1817; Say, Jour. Acad. Nat. Sci. Phila., 2, p. 265, 1822.

Modiola plicatula Lamarck, An. s. Vert., 6, p. 113, 1819; DeKay, Nat. Hist. N. Y., Moll., p. 184, pl. 24, f. 258, 1843; Verrill, Inv. Vineyard Sound, p. 693, pl. 31, f. 238, '73; Dall, Bull. 37, U. S. N. M., p. 38, pl. 54, f. 1, '89; Singley, Fourth Ann. Rept. Texas Geol. Surv., p. 325, '92. *semicostatus* Conrad, Jour. Acad. Nat. Sci. Phila., 7, p. 244, pl. 20, fig. 7, 1837. Not Dall, Bull. 37, '89.

demissus Vanatta, Proc. Acad. Nat. Sci. Phila., vol. 55, p. 756, 1903; Dall, in Matson, U. S. G. S. Prof. Paper, 98-L, p. 177, 1916.

Distribution.—Nova Scotia to Texas. Pliocene to Recent. Gulf coast.—Cedar Keys, St. Marks, Fla.; Belle Isle, Week's Island, Chandeleurs, La.; Lavaca, Matagorda and Galveston bays, Texas. Pleistocene: New Orleans pumping station No. 7; North Creek, Fla.; Ft. Morgan well, Ala. at 217-321 feet. Pliocene: Caloosahatchie.

Remarks.—Abundant in the streams of salt marshes imbedded in the peaty soil of the banks as at Week's Island, forming sod-like masses among the sedges and grasses. Mitchell has proved by experiments that this species can live twenty-two days without water.

(Brachydontes) citrinus Bolten.

Mytilus citrinus Bolten, Mus. Bolt., p. 157, 1798.

Modiola sulcata Lamarck, An. s. Vert., 6, p. 113, 1819. (Not of Lamarck, 1807); Reeve, Conch. Icon., 10, pl. 10, f. 74, 1858; Dall, Bull. 37, U. S. N. M., p. 38, '89.

Mytilus cubitus Say, Jour. Acad. Nat. Sci. Phila., 2, p. 263, 1822.

Modiolus citrinus Dall, Trans. Wagner Inst. Sci., 3, pt. 4, p. 796, 1898.

Distribution.—S. Carolina to southern Brazil. Pleistocene to Recent. Gulf coast.—Tampa.

Genus **BOTULA** Morch

cinnamomea Lamarck

Mytilus cinnamomeus etc., Chemnitz, Conch. Cab., 8, p. 152, pl. 82, f. 371, 1785. (Not binomial).

Modiola cinnamomea Lamarck, An. s. Vert., 6, p. 114, 1819; Dall, Bull. 37, U. S. N. M., p. 38, '89.

Modiolus (Botula) cinnamomeus Dall and Simpson, Bull. U. S. Fish Comm., 1, p. 470, 1901.

Distribution.—Cape Fear to Guadeloupe, 0-14 fms. West Fla.

Genus **MODIOLARIA** Beck

lateralis Say

Mytilus lateralis Say, Jour. Acad. Nat. Sci. Phila., 2, p. 264, 1822.

Modiola elliptica H. C. Lea, Am. Jour. Sci., 43, p. 106, pl. 1, fig. 2, 1842.

Crenella lateralis Tryon, Am. Mar. Conch., p. 190, pl. 40, fig. 523, 1874.

Modiolaria lateralis Dall, Bull. 37, U. S. N. M., p. 40, pl. 6, f. 7, 8, '89; T. W. I. S., 3, pt. 4, p. 807, '98; Vaughan, 2d. Ann. Rept. Fla. Geol. Surv., p. 149, 1909.

Distribution—Maine to Venezuela. Pliocene to Recent. Gulf coast.—Cameron, La., and West Fla. Pleistocene: Manatee Station, Fla.

(**Lioberus**) **castanea** Say

Modiola castanea Say, Jour. Acad. Nat. Sci., Phila., 2, p. 266, 1822.

lignea Reeve, Conch. Icon., 10, *Modiola*, pl. 10, f. 71, '58;

Dall, Bull. 37, U. S. N. M., p. 38, '89.

Modiolaria castanea Dall, Tr. W. I. S., 3, pt. 4, p. 266, '98.

Distribution.—S. Carolina to St. Thomas. West Fla. (Dall).

Genus **CRENELLA** Brown

divaricata d'Orbigny

Nuculocardia divaricata d'Orb., in De la Sagra, Hist. Pol. y

Nat. Isla de Cuba, 2, p. 311, pl. 27, f. 56-59, 1847.

divaricata Gabb, Trans. Am. Phil. Soc., 15, p. 252, '73;

Dall, Bull. 37, U. S. N. M., p. 40, '89; Tr. W. I. S., 3,

pt. 4, p. 803, '98; Maury, Bull. 29, Am. Pal., p. 194, pl.

26, f. 18, 1917.

decussata Dall, B. M. C. Z., 12, p. 235, '86. Not of Mon-

tagu.

Distribution.—Hatteras to Barbados. West Florida. Mio-
cene to Recent.

Genus **LITHOPHAGA** Bolten

bisulcata d'Orbigny

Lithodomus bisulcatus d'Orb., Hist. Pol. y Nat. Isla de

Cuba, 2, p. 333, pl. 28, f. 14-16, 1847. (First. ed. 1845).

Modiola appendiculata Philippi, Abb. u. Besch. 2, p. 150, pl.

1, f. 1, 1846.

Lithodomus appendiculatus Reeve, Conch. Icon., 10, pl. 4, f.

21, and *biexcavatus* Reeve, f. 22, *a-b*, '57.

Lithophagus bisulcatus Dall, Bull. 37, U. S. N. M., p. 38, '89.

Distribution.—S. Carolina to Rio de Janeiro. Upper Oligocene
(of Tampa) to Recent. Living at Cedar Keys, Florida.

aristata Dillwyn

Mytilus aristatus Dillwyn, Cat. Rec. Shells, 1, p. 303, 1917.

Modiola caudigera Lamarck, An. s. Vert., 6, p. 116, 1819.

Lithodomus caudigerus Reeve, Conch. Icon., 10, pl. 3, f. 16,

1857.

Lithophagus forficatus Ravenel, Proc. Acad. Nat. Sci. Phila.

for 1861, p. 44; Dall, Bull. 37, U. S. N. M., p. 38, '89.

Lithophaga aristata Dall, Tr. W. I. S., 3, pt. 4, p. 800, '98;

Checklist N. W. Coast, p. 19, 1916.

Distribution.—North Carolina to the Antilles, California to Peru, Red Sea. Upper Oligocene (of Tampa) to Recent. West Florida.

Genus **CONGERIA** Partsch

leucopheata Conrad

Mytilus leucopheatus Conrad, Jour. Acad. Nat. Sci., Phila., 6, p. 263, pl. 11, fig. 13, 1831.

Mytilopsis leucopheatus Conrad, Proc. Acad. Nat. Sci., Phila., p. 167, '57.

Dreissena americana Reeve, Conch., Icon., 10, pl. 10, fig. 43, '58.

Dreissensia (Mytilopsis) leucopheata Dall, Bull. 37, U. S. N. Mus., p. 40, '89.

leucopheata Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 808, 1898.

Distribution.—Maryland to the Antilles and Nicaragua. Pleistocene to Recent. True *Dreissensia* is European. Gulf coast.—West Florida, Point au Fer and Lake Charles, La. Pleistocene: North Beach, Fla., Knapp's wells, Terrebonne Parish, No. 2 at 1542-1632, 1550-1570, No. 3 from the surface to 700 feet, 1040-1043, 1865-2029 feet.

rossmassieri Dunker, Novitates Conch. Moll. marina, 1858; Reeve, Conch. Icon., f. 45, 1858; Dall, Trans. Wag. Inst. Sci., 3, pt. 4, p. 809, '98.

sallei Reeve, Conch. Icon., f. 44, 1858. Not of Recluz, 1852.

Distribution.—Florida to Brazil. Gulf coast.—Tampa. Shell more triangular and heavier than *leucopheata*.

Note.—A *Congeria* was found by Harris in the Galveston well at 2123-2873 feet. Upper Miocene horizon.

Genus **PERIPLOMA** Schumacher

angulifera Philippi, Zeitschr. fur Malak. for 1847, p. 73; Römer, Texas, p. 452, '49; Dall, Bull. 37, p. 64, '89; Singley, Fourth Ann. Rept., Geol. Surv. Texas, p. 330, 1893; Dall, Trans. Wagner Inst. Sci., 3, pt. 6, p. 1529, pl.

57, f. 15, 1903.

Distribution.—Georgia to Honduras. Pliocene to Recent.
Gulf coast.—West Fla.; Galveston, Matagorda, Tex. Pliocene : Shell Creek, Fla.

inaequivalvis Schumacher, Essai, p. 115, 1817; Dall, Bull. 37, p. 64, '89; T. W. I. S., 3, pt. 6, p. 1528, 1903.

Distribution.—Antilles. Texas (?)

papyracea (Say) Conrad

Anatina papyratia Say, Jour. Acad. Nat. Sci. Phila., 2, p. 314, 1822.

Periploma papyracea Conrad, Am. Jour. Conch., 2, p. 70, pl. 4, f. 9; *Idem*, p. 281, pl. 15, f. 6, '66; Dall, Bull. 37, p. 64, '89.

Distribution.—West Florida (?) to Santa Cruz.

Genus **THRACIA** Leach

distorta Montagu

Mya distorta Montagu, 1808.

Thracia distorta Dall, Bull. 37, p. 64, '89; Tr. W. I., 3, pt. 6, p. 1523, 1903.

Distribution.—Gulf of Mexico to Honduras. West Florida and Texas. Type of section *Ixartia* Leach.

phaseolina (Lamarck) Philippi, Moll. Sic. 1, t. 1, f. 7, 1836; Dall, B. M. C. Z., 9, p. 110, '81; Bull. 37, p. 64, '89.

papyracea Jeffreys, Brit. Conch., 5, pl. 48, f. 4.

Distribution.—Florida to Yucatan and England. Gulf, Yucatan Strait, 640 fms. Florida Keys, shallow water.

stimpsoni Dall, B. M. C. Z., 12, p. 307, 1886; Bull. 37, U. S. N. M., p. 64, '89.

Distribution.—Gulf of Mexico between Tampa and Tortugas, 28 fms.

Genus **ASTHENOTHAERUS** Carpenter

hemphilli Dall, B. M. C. Z., 12, p. 308, 1886; Bull. 37, p. 64, '89.

Distribution.—Gulf of Mexico : West Fla., 17 fms., Marco, Lee Co., Fla., 2 fms.

Genus **PANDORA** Hwass

(*Kennerleya*) *bushiana* Dall, B. M. C. Z., 12, p. 312, 1886; Bull. 37, p. 68, 1889.

Distribution.—Tampa and Charlotte Harbor, W. Fla., 0-4 fms.

(*Kennerleya*) *arenosa* Conrad, Jour. Acad. Nat. Sci. Phila., 7, p. 130, 1834; Fos. Medial. Tert., p. 2, pl. 1, f. 3, 1838; Dall, Tr. W. I., p. 1518, 1903.

Myadora and *Pandorella arenosa* Conrad.

Pandora carolinensis Bush, Trans. Conn. Acad., 6, p. 474, 1885; Dall, B. M. C. Z., 12, p. 311, pl. 8, f. 8, 8a, 86; Bull. 37, p. 68, pl. 8, f. 8, 8a, '89.

Distribution.—Hatteras to Yucatan, 7 to 124 fms. Miocene to Recent. Gulf coast.—Tampa, 6 fms. (Simpson). Pliocene: Shell Creek, Fla.

(*Clidiophora*) *trilineata* Say, Jour. Acad. Nat. Sci. Phila., 2, p. 261, 1822; Tuomey and Holmes, Pleioc. Fos. S. Car., p. 76, pl. 20, fig. 13, '57; Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, '78; Dall, Bull. 37, p. 68, '89; Singley, Fourth Ann. Rept. Geol. Surv. Texas, p. 330, '93; Dall, Proc. U. S. Nat. Mus., 24, p. 511, pl. 31, f. 4, 1902; Tr. W. I., 3, p. 1519, 1903.

Pandora nasuta Sowerby, Sp. Conch., figs. 18, 19, 1830; Reeve, Conch. Icon., 19, *Pandora*, pl. 3, fig. 18, 1874.

Clidiophora nasuta Carpenter, Proc. Zool. Soc., p. 597, 1864.

Distribution.—Hatteras to Gulf of Mexico, 6-18 fms. Miocene to Recent. Gulf coast.—Ft. Barranca, Fla., Galveston, Tex. Pleistocene: New Orleans well of 1856 at 61 feet, Lake Borgne borings. Pliocene: Caloosahatchie.

Genus **LYONSIA** Turton

floridana Conrad, Proc. Acad. Nat. Sci. Phila., 1848; *Idem*, Jour., p. 208, '49; Dall, Bull. 37, U. S. N. M., p. 64, '89; Singley, 4th Ann. Rept. Tex. Surv., p. 330, '93; Mitchell, Texas Shells; Dall, Tr. W. I., 3, p. 1514, 1903.

Distribution.—Gulf of Mexico to Nicaragua, 2-5 fms. Gulf coast.—Tampa, Cedar Keys, Fla., Corpus Christi, Texas.

hyalina Conrad, J. N. S. Phila., 6, p. 261, pl. 11, f. 12, (as *Mya*); Tryon, Amer. Mar. Conch., p. 51, pl. 11, f. 2, 1874; Dall, Bull. 37, p. 64, pl. 59, f. 11, '89.

Osteodesma hyalina De Kay, Nat. Hist. N. Y., 5, p. 234, pl. 33, f. 311 *a, b*, 1843.

Distribution.—Nova Scotia to Texas, 0-30 fms. Miocene to Recent.

(*Alcogramma*) *formosa* Jeffreys. Dredged in Gulf of Campeche and North Atlantic, 200-600 fms,

(*Philippini*) *beaui* d'Orbigny, Moll. Cubana, 2, p. 225, pl. 25, f. 26-28, 1845, (as *beana*, typographical error).

beauii Arango, Fauna Mal. Cuba, p. 240, 1878.

beana Dall, Bull. 37, p. 64, '89; Dall and Simpson, B. U. S. Fish Comm., 1, p. 498, '01.

braziliensis Gould, 1850, and *orbignyi* Fischer, 1857.

Distribution.—Hatteras to Brazil, 0-30 fms. West Fla. Type collected by M. Beau in the Antilles.

Genus VERTICORDIA Wood

acuticostata Philippi, Moll. Sicil., 2, p. 42, T. 14, f. 19, 1844, (as *Hippagrus*); Seguenza, Jour. de Conchy., 8, p. 291, pl. 10, f. 1 *a-e*, 1860; Dall, B. M. C. Z., 9, p. 105, '81; Bull. 37, p. 66, '89.

Distribution.—North Atlantic to Barbados, 71-600 fms. Gulf, abyssal, temperature 49° F. Very large shells. Type from upper Tertiary of Calabria.

seguenzæ Dall, B. M. C. Z., Harvard Coll., 12, p. 190, 1886; Bull. 37, p. 66, 1889.

Distribution.—Hatteras to Yucatan, 124-640 fms. Gulf of Mexico, Yucatan Strait.

woodi Smith, Challenger Rept. Lam., p. 168, pl. 25, f. 7, 7 *b*, 1885; Dall, B. M. C. Z., 12, p. 288, '86; Bull. 37, p. 66, 1889.

Distribution.—Gulf of Mexico to Brazil, 100-1060 fms. Texas region.

Genus **HALIRIS** Dall

fisheriana Dall, B. M. C. Z., 9, p. 106, 1881; *Idem*, 12, p. 291, pl. 2, f. 4 *a-b*, '86; Bull. 37, p. 66, pl. 2, f. 4 *a-b*, 1889.

Distribution.—North Atlantic to Barbados, 84-229 fms. Gulf, West Fla. region.

Genus **ANISODONTA** Deshayes

(*Basterotia*) *quadrata granatina* Dall

Corbula quadrata Hinds. See Reeve, Conch. Icon., *Corbula*, f. 40, 1843.

Poromya? *granatina* Dall, B. M. C. Z., 9, p. 109, '81.

quadrata var. *granatina* Dall, B. M. C. Z., 12, pl. 1, 2, *a-b*, 1886.

Distribution.—Typical form, Cape Lookout to St. Thomas, var., Yucatan Strait, 640 fms.

(*Fulcrella*) *elliptica* Recluz

Eucharis elliptica Recluz, Jour. de Conch. 1, p. 168, 1850.

Mya simplex Holmes, Post-Pl. Fos. S. C., p. 55, pl. 8, fig. 16, 1858.

Anisodonta elliptica Vanatta, Proc. Acad. Nat. Sci. Phila., 55, p. 756, 1903.

Distribution.—N. Carolina to West Florida. Pleistocene to Recent. Gulf coast.—Crooked Isl., Calhoun Co., Fla. The ancestral form is *A. carolina* Dall, N. Car. Miocene.

Genus **CETOCONCHA** Dall

bulia Dall, B. M. C. Z., 6, p. 61, 1878, (as *Lyonsia*); *Idem*, 9, p. 107, '81: 12, p. 283, '86, (as *Poromya*); Bull. 37, p. 68, pl. 39, f. 2, 5, pl. 65, f. 130, '89.

Distribution.—Chesapeake to Gulf of Mexico, 1917-1920 fms. Gulf, Lat. 24° N., Long. 84° W., temperature 39° F. All species recent, abyssal.

Genus **CUSPIDARIA** Nardo

glacialis Sars, Moll. Reg. Arct. Norv., 88, pl. 6, f. 8, 1878, (as *Neæra*); Verrill and Bush, Proc. U. S. N. M., 20, p. 800, pl. 71, f. 9, '98; Dall, Bull. 37, U. S. N. M., p. 66, '89; Johnson Occ. Papers, Bost. Soc. Nat. Hist. 7, No.

13, p. 41, 1915.

Distribution.—Norway and Maine to Gulf of Mexico, where it was dredged by U. S. Fish Com. at 1467 fms.

jeffreysi Dall, B. M. C. Z., 9, p. 111, '81, (as *Neæra*); *Idem*, 12, p. 295, pl. 3, f. 2, '86; Bull. 37, p. 66, pl. 3, f. 2, '89.

Distribution.—Fla. Straits to St. Vincent, 193-687 fms. Gulf of Mexico, Cape San Antonio and Yucatan Strait.

arcuata Dall, B. M. C. Z., 9, p. 113, '81, (as *Neæra*); *Idem*, 12, p. 296, pl. 3, f. 3, 4, '86; Bull. 37, pl. 3, f. 3, 4, '89.

Distribution.—Yucatan Strait, 640 fms. Doubtful species founded on a toothless left valve.

rostrata Spengler. See G. O. Sars, p. 89, t. 6, f. 7a, b, (as *Neæra*); Dall, Bull. 37, p. 66, '89.

Distribution.—Arctic Ocean to Barbados, 65-1639 fms. West Fla. region. (Dall).

(*Cardiomya*) *costellata* Deshayes

Corbula costellata Desh., Expl. Sci. Morea, Géol., p. 86, pl. 7, f. 1-3, 1837.

Sphæna costellata d'Orbigny, Moll. Cuba, 2, p. 286, 1846; Atlas, pl. 27, f. 17-20, 1845.

Cardiomya costellata Dall, B. M. C. Z., 12, p. 297, '86; Bull. 37, p. 66, '89.

Distribution.—Hatteras to St. Thomas, 2-205 fms. Gulf coast, Marco, Fla., shallow water.

(*Cardiomya*) *perrostrata* Dall, B. M. C. Z., 9, p. 10, '81, (as *Neæra*); *Idem*, 12, p. 296, pl. 2, f. 3 a-b, '86; Bull. 37, p. 66, pl. 2, f. 3 a-b, '89; Johnson, Occ. Papers, Bost. Soc. Nat. Hist., 7, No. 13, p. 42, 1915.

Distribution.—Martha's Vineyard, Mass.; Gulf of Mexico, off the Tortugas, and South to Grenada, 84-416 fms.

Genus **MYONERA** Dall and Smith

lamellifera Dall, B. M. C. Z., 9, p. 113, '81, (as *Neæra*); *Idem*, 12, p. 304, pl. 3, f. 7, '86; Bull. 37, p. 68, pl. 3, f. 7, '89.

Distribution.—Florida to Jamaica, 84-250 fms. Gulf of Mexico, off Cedar Keys. All species recent, abyssal.

Genus **CORALLIOPHAGA** Blainville

coralliophaga Gmelin, Syst. Nat., p. 3305, No. 25, 1792, (as *Chama*); Lamarck, An. s. Vert. 6, p. 28, 1819, (as *Cypri-cardia*); Dall, Trans. Wag. Inst., p. 1498, 1903.

carditoidea Blainville, Man. Mal., p. 560, pl. 76, f. 3, 1825; Reeve, Conch. Icon., pl. 2, f. 12; Dall, Bull. 37, U. S. N. Mus., p. 58, '89.

Cypricardia hornbeckiana d'Orbigny, Moll. Cubana, 2, p. 266, pl. 26, f. 33, 34, 1846.

Distribution.—Florida to Curaçao, 0-30 fms. Gulf, Cedar Keys and Texas. Pliocene: Caloosahatchie.

Genus **ASTARTE** Sowerby

globula Dall, B. M. C. Z., 12, p. 260, 1886; Dall, Bull. 37, U. S. Nat. Mus., p. 46, '89; Proc. U. S. Nat. Mus., 26, p. 940, 1903.

Distribution.—Fernandina to Cuba and the Gulf of Mexico, 294-539 fms. First described as a variety of *A. smithi*.

smithi Dall, B. M. C. Z., 12, p. 259, pl. 7, f. 5 *a-b*, '86. Bull. 37, p. 46, pl. 7, f. 5 *a-b*, '89; Proc. U. S. Nat. Mus., 26, p. 940, 1903.

Distribution.—Sombrero to Barbados, 54-1568 fms. Gulf of Mexico, Campeche Bank, 200 fms.

nana Jeffreys, in Smith, Leeds Jour. Conch., p. 213, 1881; Dall, B. M. C. Z., 12, p. 261, pl. 7, f. 6 *a-b*, '86; Proc. N. M., 26, p. 940, 1903.

Distribution.—Hatteras to Sombrero, 6-227 fms. Variety *trigona*. Jeffreys, Gulf of Mexico.

liogona Dall, Proc. U. S. Nat. Mus., 26, pp. 940, 948, pl. 62, f. 9, 1903.

Distribution.—Mississippi Delta region, 118 fms.

Genus **CRASSATELLITES** Kruger

gibbesi Tuomey and Holmes, Pleioc. Fos. S. Car., p. 74, pl. 20, f. 9, 10, 1856; Harris, Bull. Am. Pal. 1, No. 3, p. 7, 1895; Dall, Tr. W. I., 3, p. 1474, 1903.

floridana Dall, B. M. C. Z., 12, p. 256, pl. 6, f. 12, '86;

Bull. 37, U. S. N. M., p. 48, pl. 6, f. 12, pl. 42, f. 4, '89.

Distribution.—Hatteras to Barbados, 3-100 fms. Upper Miocene to Recent. Gulf coast.—Recent: West Fla., 30 fms. Pliocene: Charlotte Harbor, Fla. Upper Miocene: Galveston well at 2158-2920 feet. (Harris).

(*Cuna*) *dalli* Vanatta, Proc. Acad. Nat. Sci. Phila., 55, p. 759, f. 3, 1903.

Distribution.—Indian Pass, West Fla. (type locality). Pleistocene shells resembling this species were found in the New Orleans Gymnasium well at 1200 feet.

Note.—Recent species of *Cuna* were thought to be exclusively Australian and Japanese. The only known American species was Claibornian Eocene. Vanatta's discovery shows that the genus has existed sparsely in the Gulf of Mexico from early Tertiary to Recent time.

Genus **CRASSINELLA** Guppy

galvestonensis Harris, Bull. Am. Pal. 1, No. 3, p. 8, pl. 1, f. 2 *a-b*, 1895, (as *Eriphyla*); Dall, Tr. W. I. S., 3, p. 1478, pl. 49, f. 14, 1903.

Distribution.—Recent: Galveston. Miocene: Md., Va.; Sea Isle City, N. J., well at 785 feet; Galveston well at 2600 feet. (Type locality).

Note.—Professor Harris remarked in his description, "The new *Eriphyla* will probably be found Recent on the Gulf shore." Comparisons of shells from the beach with the deep well type now prove this to be the case. The species has continued on unchanged and lived in the same locality from Upper Miocene time.

lunulata Conrad

Astarte lunulata Conrad, Jour. Acad. Nat. Sci. Phila., 7, p. 133, 1834; Tuomey and Holmes, Pleio. Fos. S. Car., p. 72, pl. 20, fig. 4, '57; Holmes, Post-Plio. Fos. S. C., p. 32, pl. 6, fig. 9, '60; Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, '78.

Eriphyla lunulata Dall, Bull. 37, p. 48, pl. 58, f. 11, 13, '89;

Singley, Fourth Ann. Rept. Geol. Surv. Texas, p. 326, 1892.

Crassatellites (Crassinella) lunulatus Dall, Trans. Wag. Inst. Sci., 3, p. 1477, pl. 49, fig. 15, 1903; Vaughan, Publ. 133, Carn. Inst., p. 171, 1910.

? *mastracea* Linsley, Am. Jour. Sci., 48, p. 275, 1845; Johnson, Occ. Papers, Bost. Nat. Hist. Soc., 7, p. 45, 1915.

Distribution.—Tentatively including the northern form, *C. mastracea*, as identical.—Cape Cod to Barbados, 3-100 fms. Miocene to Recent. Gulf coast.—Recent: Indian Pass, St. Joseph's Bay, Crooked and Sarasota Isls., Fla.; Galveston. Pleistocene: Labelle, Fla., New Orleans pumping station No. 7, New Orleans artesian well of 1856, New Orleans Gymnasium well at 1200 feet, Lake Borgne borings, Knapp's Wells, Terrebonne Parish No. 2 at 1190-1430, 1542-1632, 1780-1790, 1800, No. 2 from the surface to 700 feet, 570-700 700-780, 790-830, 1043, 1150-1200, 1796-1842 feet. Pliocene: Caloosahatchie, Shell and Alligator Creeks, Fla. Miocene: Sharp Benckenstein No. 1 well, Jennings, La., at 2050 feet; Jennings Heywood Oil Syndicate's well No. 29 at 1941-1961 feet. Type locality Miocene of Suffolk, Va.

Genus **CYRENA** Lamarck

caroliniana Bosc, Hist. Nat. des Coq., 3, p. 37, p. 18, f. 4, 1802, (as *Cyclas*); Say, Amer. Conch., 7, pl. 42, '33; Dall, Tr. W. I., 3, p. 1447, 1903.

caroliniensis Lamarck, An. s. Vert., 5, p. 553; Holmes, Post-Pl. Fos. S. Car., p. 31, pl. 6, f. 7, '60; Mitchell, List Tex. Sh., p. 5; Dall, Bull. 37, p. 56, '89.

floridana Sowerby, Conch. Icon., pl. 18, f. 102, '78. Not of Conrad, 1846.

Distribution.—In brackish water, S. Carolina to Cuba. Pleistocene to Recent. Gulf coast.—St. Marks, Fla., Week's Isl., La., Lavaca and Carancahua Bays, Tex. Pleistocene: Osprey, North Creek, Fla.

floridana Conrad, Proc. Acad. Nat. Sci., Phila., 3, p. 23, pl. 1, f.

1, '46 ; Dall, Proc. U. S. N. M., 6, p. 338, '83 ; Bull. 37, p. 58, '89 ; Singley, 4th. Ann. Rept. Tex., p. 328, '92 ; Dall, Tr. W. I. 3, p. 1446, 1903.

protecta Conrad, Am. Jour. Conch., 5, p. 107, pl. 12, f. 3, 1869.

donaciformis Sowerby, Conch. Icon., *Cyrena*, pl. 19, f. 108, 1878.

Distribution.—In salt marshes, Florida to Yucatan. Pleistocene to Recent. Gulf coast.—Sarasota Bay, Tampa, Fla., Point au Fer, Belle Isle, La., Corpus Christi, Laguna Madre, Tex. Pleistocene : Osprey, North Creek, Fla.

Genus **CARDITA** Bruguière

(**Carditamera**) *gracilis* Shuttleworth, Journ. de Conchy., 5, p. 173, 1856 ; Dall, Bull. 37, U. S. N. M., p. 46, '89 ; Proc. Acad. Nat. Sci. Phila., p. 702, 1902.

Distribution.—Florida to St. Thomas, W. I. Gulf coast.—Tampa Bay.

(**Carditamera**) *floridana* Conrad, Fos. Med. Tert., p. 12, 1838 ; Amer. Jour. Sci, p. 393, '46 ; Dall, Bull. 37, U. S. N. M., p. 46, '89 ; Singley, 4th Ann. Rept. Tex., p. 326, '92 ; Mitchell, List Tex. Sh. ; Dall, Proc. Acad. N. Sci., Phila., p. 702, 1902 ; Vanatta, *Idem*, p. 756, 1903 ; Dall, Tr. W. I. S., 3, p. 1415, pl. 56, f. 11, '03.

gibbosa Reeve, Conch. Icon., *Cardita*, pl. 4, f. 21, '43 ; Krebs, W. I. Shells, p. 123, 1864.

Distribution.—Florida to Yucatan, shallow water. Pliocene to Recent. Gulf coast.—Crooked Isl., Calhoun Co., Alligator Harbor, Franklin Co., Ft. Barranca, St. Marks, Cedar Keys, Fla. ; Matagorda and Espiritu Santo Bays, Corpus Christi, Tex. Pleistocene : North Creek, near Osprey, Fla.

(**Gians**) *dominguensis* d'Orbigny, Moll. Cuba, 2, p. 291, 1853 ; Dall, Bull. 37, U. S. N. Mus., p. 46, 1889 ; Proc. Acad. Nat. Sci. Phila., p. 703, 1902 ; Tr. W. I. S., 3, p. 1616, 1903.

Distribution.—Hatteras to Sombrero, 36-124 fms. Recent in the Gulf of Mexico (Dall) and Pleistocene of North Creek, Manatee Co., Fla.

Note.—*Cardita conradi* Shuttleworth, (Journ. de Conchy., 5, p. 173, 1856; Dall, Bull. 37, U. S. N. M., p. 46, '89) is erroneously cited from Tampa. It is an East Indian shell, not found in American waters.

Genus **VENERICARDIA** Lamarck

tridentata Say, Jour. Acad. Nat. Sci., Phila., 5, p. 216, 1826; Binney's Say, p. 124, pl. 40, f. 1-5, '58; Dall, Bull. 37, p. 46, '89; Tr. W. I. S., 3, p. 1433, 1903; Vaughan, Carn. Publ. 133, p. 171, 1910.

Cardita tridentata Conrad, Fos. Medial Tert., p. 76, pl. 43, fig. 11, '45; Tuomey and Holmes, Pleioc. S. Car., p. 67, pl. 19, f. 9, 10, '55; Holmes, Post-Pl. Fos. S. Car., p. 31, pl. 6, f. 8, 58. Not Reeve's figure, which is an exotic shell.

Distribution.—Hatteras to West Fla., 36-124 fms. Miocene to Recent. Gulf coast.—Recent: Charlotte Harbor, Fla. Pleistocene: Labelle, Fla. Pliocene: Caloosahatchie marl:

armilla Dall, Proc. Acad. Nat. Sci. Phila., pp. 704, 713, 1902.

Distribution.—Dredged by S. S. Albatross in 24-196 fms. between the Mississippi delta and Cedar Keys, Fla.

perplana Conrad, Am. Jour. Sci., 41, p. 347, 1841; Dall, Proc. Acad. Nat. Sci. Phila., p. 705, 1902.

flabella Conrad, 1846, (as *Astarte*); Dall, Bull. 37, U. S. N. M., p. 46, '89, (*Venericardia*).

Distribution.—Hatteras to Florida. 14-52 fms. Upper Miocene to Recent. Gulf coast.—Charlotte Harbor, Fla.

Genus **CHAMA** Linnæus

congregata Conrad, Am. Jour. Sci., 23, p. 341, 1833; Fos. Med. Tert., p. 32, pl. 17, f. 2, '38; Tuomey and Holmes, Pleioc. Fos. S. Car., p. 23, pl. 7, f. 7-10, '55; Whitfield, Mio. N. J., p. 65, pl. 9, f. 14-18, '95; Dall, Tr. W. I., 3, p. 1400, 1903.

Distribution.—Hatteras to Yucatan, 0-52 fms. Miocene to Recent. Gulf coast.—West Fla.

macrophylla Gmelin, Syst. Nat., 6, p. 3304, 1792; d'Orbigny, Moll. Cuba., 2, p. 363, 1853; Reeve, Conch. Icon., 4, pl. 2, f. 6, pl. 8, f. 6 *b*, '47; Dall, Bull. 37, U. S. N. M., p. 52, '89; Tr. W. I. S., 3, p. 1403, 1903. Often, but erroneously, *macrophylla*.

citrea Gmelin, 1792; *lazarus* Lamarck, 1819; *bicornis* Krebs, 1864, not of Linnæus.

Distribution.—Hatteras to Abrolhos Isls. Pleistocene to Recent. Gulf coast.—Tampa.

Genus **ECHINOCHAMA** Fischer

arcinella

Chama arcinella Linnæus, Syst. Nat. ed. 12, p. 1139, 1767; Reeve, Conch. Icon., 4, pl. 5, f. 26 *a-b*, 1846; Conrad, Am. Jour. Sci., 2d Ser., 1, p. 404, '46; Tuomey and Holmes, Pleio. Fos. S. C., p. 22, pl. 7, f. 4-6, '57; Emmons, Geol. Rep. N. Car., p. 287, f. 209, '58; Dall, Bull. 37, U. S. N. Mus., p. 52, 1889; Vanatta, Proc. Acad. Nat. Sci. Phila., vol. 55, p. 757, 1903; Mitchell, List Texas Shells.

Chama (Echinochama) arcinella Fischer, Man. de. Conchyliologie, p. 1049, 1887.

Echinochama arcinella Dall, Tr. W. I. S., 3, p. 1405, 1903.

Distribution.—N. Carolina to Sao Paulo, Brazil, 0-26 fms. Pliocene to Recent. Gulf coast.—Recent: St. Joseph's Bay, Florida., Matagorda, Tex. Pleistocene: New Orleans pumping station No. 7. Pliocene: Caloosahatchie, Shell Creek, &c., Fla.

Genus **LUCINA** Lamarck

chrysostoma Mueschen

Tellina chrysostoma Mueschen, Mus. Gevers., p. 482, 1787. (Typographical error.).

chrysostoma Philippi, Abb. und Beschr. neu Conchyl., 2, p. 206, pl. 1, f. 3, 1847; Dall, Proc. U. S. Nat. Mus., 23, p. 802, 1901; Tr. W. I. S., 3, p. 1354, '03; Vanatta, Proc.

Acad. Nat. Sci. Phila., 55, p. 756, '03.

Venus edentula Chemnitz, Conch. Cab. 7, pl. 40, f. 427-429, 1784. Not of Linnæus, 1758.

Lucina edentula Reeve, Conch. Icon., *Lucina*, pl. 2, fig. 9, 1850: Heilprin, Tr. Wagner Inst. 1, p. 102, '86.

Loripes edentula var. *chrysostoma* Dall, Bull. 37, U. S. N. M., p. 52, '89.

Distribution.—Florida to Santa Cruz, shallow water. Miocene(?) to Recent. Gulf coast.—Tampa, Ft. Barranca, St. Joseph's Bay and Crooked Island, Fla. Pliocene: Caloosahatchie.

philippiana Reeve, Conch. Icon., *Lucina*, pl. 5, f. 23 *a-b*, 1850; Dall, T. W. I., 3, p. 1355, 1903.

edentula Philippi, '47. Not of Linnæus, nor Reeve.

sehrhammi Crosse, Jour. de Conchy., 24, p. 166, '76.

Loripes edentula Dall, Proc. U. S. Nat. Mus., 6, p. 338, '83; Singley, Fourth Ann. Rept. Tex., p. 326, '92; Mitchell, List Texas Shells, p. 14.

Distribution.—West Indies and Gulf of Mexico. Pleistocene to Recent. Gulf coast.—Sarasota Bay, Fla., Matagorda and Corpus Christi Bays, Tex.

Note.—Both this and the preceding genus have been confused with *L. edentula* Linn. According to Hanley, the true *edentula* is oriental.

Genus MYRTAEA Turton

compressa Dall, B. M. C. Z., Harvard Coll., 9, p. 135, 1881. (as *Loripes*); *Idem*, 12, p. 266, pl. 14, f. 2, '86; Bull. 37, U. S. N. M., p. 52, pl. 14, f. 2, '89; Proc. U. S. N. M., 23, p. 804, 1901.

Distribution.—Cuba and Sombrero Isl., 72-424 fms.; Gulf of Mexico off Cape San Antonio, 413 fms. Possibly a variety of the following species.

lens Verrill and Smith, Trans. Conn. Acad., 5, p. 569; 6, p. 259, 1880, (as *Loripes*); Amer. Jour. Sci., 20, p. 4; Dall, B. M. C. Z., 12, p. 266; Bull. 37, U. S. N. M., p. 52,

89; Proc. U. S. N. M., 23, p. 804, 1901; Johnson, Occ. P. Bost. Soc. Nat. Hist., 7, p. 61, 1915.

Distribution.—Cape Cod to Rio de Janeiro, 50 to 464 fms. Gulf of Mexico, 321 fms. Temperature 46° F.

(*Eulopia*) *sagrinata* Dall, B. M. C. Z., 12, p. 265, 1886, (as *Lucina*); Bull. 37, U. S. N. M., p. 52, '89; Proc. U. S. N. M., 12, p. 263, pl. 14, fig. 11, '89; 23, p. 805, 1901.

Distribution.—Gulf of Mexico to Yucatan, 85-300 fms.

Genus **CODAKIA** Scopoli

cubana Dall, Proc. U. S. N. M., 23, p. 799, 1901.

Loripes icterica Dall, B. M. C. Z., 9, p. 135, '81. Not of Reeve, 1850.

Lucina lenticula Dall, B. M. C. Z., 12, p. 265, '86. Not of Reeve, 1850.

Distribution.—Antilles and Gulf of Mexico, Yucatan Strait, 640 fms.

orbicularis Linnæus, Syst. Nat. ed. X, p. 688, 1758, (as *Venus*); Dall, Proc. U. S. N. M., 23, p. 799, 1901; Dall and Simpson, Bull. U. S. Fish Comm., 1, p. 491, '01; Dall, Tr. W. I., 3, p. 1347, '03. Not *Lucina orbicularis* Sowerby, 1837; nor of Deshayes, 1836.

Venus tigrina var. Linnæus, 1767.

Cytherea tigrina Lamarck, An. s. Vert., 5, p. 574, (not p. 569), 1818.

Lucina tigrina Reeve, Conch. Icon., 6, *Lucina*, pl. 1, f. 3, '50; Dall, Bull. 37, U. S. N. M., p. 50, '89; Singley, 4th Ann. Rept. Texas, p. 326, '93. Not *tigrina* Linnæus.

Distribution.—St. Augustine to northern South America, shallow water. Pliocene to Recent. Gulf coast.—West Fla. and Galveston. Pliocene: Caloosahatchie and Shell Creek, Fla.

Note.—This species has been confused with *tigrina* Linn. which is Indo-Pacific.

(*Jagonia*) *orbiculata* Montagu, Test. Brit., Suppl., p. 42, pl. 12, f.

1, 1808, (as *Venus*); Dall, Proc. U. S. N. M., 23, p. 799, 1901; Tr. W. I., 3, p. 1350, '03.

Lucina squamosa Lamarck, An. s. Vert., 6, p. 542, 1818 (not Lam., 1806); Dall, Bull. 37, U. S. N. M., p. 50, '89.

Lucina pecten Lamarck, An. s. Vert., 5, p. 543, 1818; Dall, Bull. 37, p. 50, '89. The true *L. pecten* is Mediterranean.

Lucina imbricatula C. B. Adams, Proc. Bost. Soc. N. Hist., 2, p. 10, 1845.

Note.—Dr. Dall (Synopsis Lucinacea), recognizes four varieties of this species:—*orbiculata* Montagu, *filiata* Dall, *imbricatula* C. B. Adams, and *recurvata* Dall. Our specimens from Cedar Keys seem typical *orbiculata*. The deep water form, *filiata*, 85-300 fms., was dredged off Yucatan, and *recurvata*, 8-300 fms., off Cape San Antonio.

Distribution.—Florida to Brazil, also west coast Africa. Pleistocene to Recent. Gulf coast.—Tampa and Cedar Keys, Florida.

(*Jagonia*) *costata* d'Orbigny, Moll. Cubana., 2, p. 296, pl. 27, f. 40-42, 1846, (as *Lucina*); Dall and Simpson, Bull. U. S. Fish Comm., 1, p. 492, 1901; Dall, Proc. U. S. N. M., 23, p. 799, 1901. Not *costata* Tuomey and Holmes.

Lucina antillarum Reeve, Conch. Icon., *Lucina*, pl. 10, f. 37, 1850; Dall, B. M. C. Z., 9, p. 136, '81; 12, p. 264, 1886.

Distribution.—N. Carolina to Rio de Janeiro. Gulf of Mexico: Charlotte Harbor, Fla., 13 fms., Yucatan Strait, 640 fathoms.

Genus PHACOIDES Gray

pectinatus Gmelin, Syst. Nat., 6, p. 3236, 1792; Index Test., pl. 4, f. 44, 1828, (as *Tellina pectinata*); Dall, Proc. U. S. N. M., 23, p. 807, 1901; Tr. W. I. 3, p. 1363, '03. Not of Adams, '47 and '52, nor of Carpenter, '57.

jamaicensis Chemnitz, Conch. Cab., 7, p. 24, pl. 39, f. 408, 409, 1784, (as *Venus*). Not binomial. Spengler, Skrift. Nat. Selsk. Kjobn. 4, 1778, (as *Tellina*); Lamarck, An. s.

Vert., 6, p. 539, 1818, (as *Lucina*); Reeve, Conch. Icon., 6, *Lucina*, pl. 2, f. 7 *a-b*, 1850; Dall, Bull. 37, U. S. N. M., p. 50, '89; Singley, 4th Ann. Rept. Tex., p. 326, '92; Mitchell, List Tex. Sh., p. 5.

scabra Chemnitz, Conch. Cab., 11, p. 207, pl. 199, f. 1943-4, (as *Tellina*); Dillwyn, Descr. Cat., 1, p. 96, 1817.

funiculata Reeve, Conch. Icon., 6, *Lucina*, pl. 7, f. 40, '50.

Distribution.—St. Augustine to Montevideo. Pliocene to Recent. Gulf coast.—Ft. Barranca, Fla., Galveston, Corpus Christi, Keller's, Lavaca, and Matagorda Bays, Tex. Pleistocene: New Orleans pumping station No. 7; North Creek, Manatee Co., Fla.; Pliocene: Caloosahatchie, Shell and Alligator Creeks and Myakka River, Fla.

(Here) *pennsylvanicus* Linnæus, Syst. Nat., ed. X, p. 688, 1758. (as *Venus pennsylvanica*); Reeve, Conch. Icon., 6, *Lucina*, pl. 6, f. 29, 1850; Dall, Bull. 37, U. S. N. M., p. 50, '89; Tr. W. I. S., 3, p. 1368, 1903; Vaughan, Publ. 133, Carn. Inst., p. 171, 1910.

grandinata and *speciosa* Reeve, 1850. Not *speciosa* Rogers, '36.

Distribution.—Hatteras to Guadeloupe, and West Florida. Pleistocene: Labelle, West Fla. Pliocene; Caloosahatchie.

(Here) *sombrerensis* B. M. C. Z., Harvard Coll., 12, p. 264, 1886; Proc. U. S. N. M., 12, p. 263, pl. 14, f. 13, '89; 23, p. 808, 1901.

Distribution—West Fla., 50 fms., Sombrero, 72 fms.

(*Pleurolucina*) *leucomya* Dall, B. M. C. Z., 12, p. 264, '86; P. U. S. N. M., 12, p. 263, pl. 14, f. 6, 7, '89; 23, p. 808, '01. Hatteras to Cuba and Gulf of Mexico.

(*Cavilucina*) *trisulcatus* Conrad, Trans. Am. Asso. Nat. and Geol. 1, p. 110, 1841 (as *Lucina trisulcata*); Fos. Medial Tert., p. 71, pl. 40, fig. 5, '45; Tuomey and Holmes, Pleio. Fos. S. C., p. 62, pl. 18, f. 18, 19, '57; Holmes, Post-Pl. Fos. S. C., p. 28, pl. 6, f. 4, '60; Dall, Bull. 37, p. 50, '89; Proc. U. S. N. M., 23, p. 808, 1901; Tr. W. I., 3, p. 1369, '03; Vanatta, Proc. A. N. S. Phila., 55, p. 756, '03.

multristriata Conrad, Proc. Acad. Nat. Sci. Phila., p. 307, 1843; Fos. Medial Tert., p. 71, pl. 40, fig. 6, 1845, (as *Lucina*);

Proc. Acad. N. S., Phila., p. 577, '63, (as *Codakia*). Not *multistriatus* Tuomey and Holmes.

Note.—Dr. Dall questions whether this species is found in the Recent, but our specimens resemble the type closely except in not having the interior margin crenulated. To the larger, flatter recent shell from the West Indies, characterized by less pronounced resting stages, Dr. Dall has given the varietal name of *blandus*. (B. U. S. Fish Comm., 1, p. 493, pl. 6, fig. 13, 1901.)

Distribution.—Hatteras to Cuba, 0-18 fms. Miocene to Recent. Gulf coast.—Ft. Barranca and Crooked Isl., Fla. Pliocene: Caloosahatchie and Shell Creek.

(*Cavilucina*) *recurrens* Dall, Tr. W. I. S., 3, p. 1369, pl. 52, f. 11, 1903.

Distribution.—Miocene of Jamaica, Chipola River marl and Oak Grove sands, Fla., and of the Mobile, Ala., No. 2 well, Bascom race track, at 1241 and 1600 feet.

Note.—This little shell was common in the Mobile region during Miocene time, as there are twenty-five valves from the Alabama well. They agree perfectly with specimens from Oak Grove.

(*Lucinisca*) *plesiolophus* Dall, Tr. W. I. S., 3, p. 1196, pl. 40, f. 2, 5, 1900, (as *Lucina*); *Idem*, p. 1371, 1903.

Distribution.—Miocene of the Oak Grove sands, Santa Rosa County, Fla., and of the Mobile Oil Company's No. 2 well, Bascom race track, near Mobile, Alabama, at 1241 feet.

(*Lucinisca*) *nassula* Conrad, Am. Jour. Sci., 2, p. 392, 1846, (as *Lucina*); Proc. A. N. S. Phila., 3, p. 24, '46; Dall, Proc. U. S. N. M., 23, p. 808, '01; Tr. W. I. S., 3, p. 1372, '03; Vanatta, Proc. A. N. S. Phila., 55, p. 756, '03; Vaughan, Publ. Carn. Inst., 133, p. 171, 1910.

lutea Conrad, Am. Jour. Conch., 2, p. 281, pl. 15, f. 7, '66; Dall, Bull. 37, p. 52, '89.

Distribution.—Hatteras to Cuba, 0-200 fms. Pleistocene to Recent. Gulf coast.—Recent: Cedar Keys, Ft. Barranca, St. Mark's, St. Joseph's Bay, Crooked Island, Fla.;

Mobile Bay, Ala. Pleistocene: North Creek and Labelle, West Fla. Pliocene: Variety *caloosana* Dall, Caloosahatchie and Shell Creek.

(*Pseudomilitha*) *floridanus* Conrad, Am. Jour. Sci., 23, p. 344, 1833, (as *Lucina floridana*); Dall Bull. 37, U. S. N. M., p. 50, '89; Harris, Bull. Am. Pal., 1, p. 90, '95; Dall, List Cameron Sh.; Proc. U. S. N. M., 23, p. 809, '01; Vanatta, Proc. A. N. S. Phila., 55, p. 756, '03.

Distribution.—West Florida to Texas. Upper Miocene (?) to Recent. Localities.—Charlotte Harbor, Ft. Barranca, St. Mark's, St. Joseph's Bay, Crooked Island, Fla.; Horn Island, Miss.; Chandeleurs, La.; Corpus Christi, Texas. Pleistocene: Osprey, Fla. Upper Miocene (?): Galveston well at 2236-2861 feet (Harris). Possibly these well fragments were referable to *P. anodonta*, a closely related Miocene and Pliocene species.

(*Callucina*) *radians* Conrad, Trans. Am. Asso. Nat. and Geol. 1, p. 110, 1840, (as *Lucina*); Am. Journ. Sci., 41, p. 347, '41; Emmons, Geol. Rep. N. C., p. 291, '58; Tuomey and Holmes, Pleio. Fos. S. C., p. 57, pl. 18, f. 4, 5, '57; Holmes, Post-Pl. Fos. S. C., p. 28, pl. 6, f. 3, '60; Dall, Proc. U. S. Nat. Mus., 23, pp. 808, 809, pl. 42, f. 8, '01; Tr. W. I. S., 3, p. 1380, '03; Vanatta, Proc. A. N. S., Phila., 55, p. 756, '03; Vaughan, Publ. 133, Carn. Inst., p. 171, 1910.

radiata Conrad, Fos. Medial Tert., p. 70, pl. 40, f. 3, 1845, (as *Lucina*); Not of Deshayes, '43.

Distribution.—N. Carolina to Porto Rico, 5-85 fms. Upper Miocene to Recent. Gulf coast.—St. Joseph's Bay, Ft. Barranca, Fla.; Horn Island, Miss. Pleistocene: New Orleans pumping station No. 7; Labelle, Fla.

(*Parvilucina*) *piluliformis* Dall, Trans. Wagner Inst. Sci., 3, p. 1382, pl. 52, f. 6, 1903; Aldrich, MS, in coll.

Distribution.—Miocene of Oak Grove, Santa Rosa Co., Fla., and of the Bascom No. 1 well, Mobile, Alabama, at 1500-1556 feet; Bascom No. 2 well at 1241, 1600 and 1800 feet.

(Parvilucina) crenulatus Conrad

Lucina crenulata Conrad, in Morton's Synopsis Org. Rem., App., p. 2, 1834; Jour. Acad. Nat. Sci. Phila., 7, p. 125, '34, (*nomina nuda*); Conrad, Fos. Medial Tert., p. 39, pl. 19, 2d ed., f. 8; p. 39, pl. 20, f. 2, '40; Tuomey and Holmes, Pleio. Fos. S. C., p. 60, pl. 18, f. 14, 15, '57; Harris, Bull. Am. Pal. 1, No. 3, p. 90, '95. Not of Wood, 1850.

lens Lea, 1845. Not of Deshayes, 1843.

leana d'Orbigny, Prodr. Pal. 3, p. 117, '52; Conrad, Proc. Acad. Nat. Sci. Phila., 14, p. 577, '63.

crenulatus Dall, Tr. W. S., 3, p. 1383, pl. 55, f. 12, 1903.

Distribution.—Miocene of New Jersey to Florida (upper bed, Alum Bluff); and of the Galveston well at 2410-2871 feet (Harris).

Note.—Dr. Hilgard identified a shell from the Lake Borgne borings, La., as this species, but it was probably *P. multilineatus*, since *P. crenulatus* is not later than Miocene.

(Parvilucina) multilineatus Tuomey and Holmes

Lucina multilineata T. and H., Pleio. Fos. S. C., p. 61, pl. 18, f. 16, 17, 1857; Emmons, Geol. Rep. N. Car., p. 291, Holmes, Post-Pleioc. Fos. S. C., p. 30, pl. 6, fig. 6, 1860; Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, 1878; Dall, Bull. 37, p. 52, '89.

crenulata Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, '78; Dall, Bull. 37, U. S. N. M., p. 50, '89; Singley, 4th Ann. Rept. Tex., p. 326, '92. Not of Conrad, 1834.

crenella Dall, Proc. U. S. N. M., 23, pp. 810, 825, pl. 39, f. 2, '01; Vanatta, Proc. Acad. N. Sci., Phila., p. 756, '03; Dall, in Matson, U. S. G. S. Prof. P. 98-L, p. 177, 1916.

multilineatus Dall, Trans. Wag. Inst. Sci., 3, p. 1384, '03; Vaughan, Carn. Publ., 133, p. 171, 1910.

Remarks.—The recent shell was described as *L. crenella* and its Pliocene and Pleistocene ancestor as *L. multilineata*, but they seem to intergrade. The shell has often been confused with the Miocene *crenulatus*. Tuomey and

Holmes, (Pleio. Fos. S. Carolina, p. 61, 1857), refer *L. multilineata* to Conrad, (Fos. Med. Tert. Form., p. 71, pl. 40, fig. 6), but that species is *L. multistriata* Conrad, a synonym of Conrad's *L. trisulcata*. The only good figure of this species is Dall's, (*crenella*), Proc. U. S. Nat. Mus., vol. 23, pl. 39, fig. 2, 1901.

Distribution.—Hatteras to Cuba, 15-124 fms. Pliocene to Recent. Gulf coast.—Recent: Ft. Barranca, St. Joseph's Bay, Crooked Island, Fla.; Horn Island, Miss.; Galveston, Corpus Christi, Tex. Pleistocene: Osprey, Orient, Labelle and Manatee, Fla.; Fort Morgan, Ala., well at 217-421 feet; New Orleans artesian well of 1856 at 546; Febacher's well, New Orleans, at 1200; Lake Borgne borings; Knapp's wells, Terrebonne Parish, No. 2 at 1050-1190, 1190-1430, 1434-1519, 1519-1542, 1780-1790, No. 3 at 1150-1200, 1330-1375, 1400-1440, 1443-1470, 1500-1525 feet. Pliocene: Caloosahatchie marl.

(*Parvilucina*) *fontis*, new species.

PLATE I, FIGURE 1

Shell very small, suborbicular, with nearly central, rather prominent, acute beaks. Lunule deep, lanceolate; radial sculpture of fine but well-marked, rounded riblets, slightly unequal, not divaricating, and alternating with narrower interspaces. Riblets absent from the dorsal area. Concentric sculpture of narrow, slightly raised lamellæ, which cross the broader riblets. The lamellæ become stronger over the dorsal area where the riblets are absent. Hinge heavy in proportion to the shell. Right valve with a strong posterior, and a weaker anterior lateral tooth, and one rather prominent cardinal tooth. Inner margin of shell crenulate. Length and height 4 mm., semidiameter 1.5 mm. This species resembles closely *Phacoides approximatus* Dall, dredged in the Gulf of California at 26 fms. The two species would seem to have been undoubtedly derived from a common ancestor.

Geological horizon.—The shell was found at great depths at a doubtful horizon where, though recent forms largely prevail, a slight change in the fauna appears. This leads one to think that one may be approaching the Upper Miocene.

Occurrence.—Knapp's No. 1 well, Terrebonne Parish, La., at 2000-2150 and 2250-2450 feet.

(*Bellucina*) *amiantus* Dall, Proc. U. S. Nat. Mus., 23, p. 826, pl. 39, f. 10, 1901; Tr. W. I. S., 3, p. 1386, '03; Vanatta, P. A. N. S., Phila., 55, p. 757, '03.

Lucina costata Holmes, Post-Pl. Fos. C., p. 27, pl. 6, fig. 2, 1860. Not of D'Orbigny, 1846; nor of Tuomey and Holmes, 1857 (= *tuomeyi* Dall).

costata Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, '78; Dall, Bull. 37, U. S. Nat. Mus., p. 50, '89; Singley, 4th Ann. Rept. Tex., p. 326, '92; Mitchell, List Tex. Sh.

Distribution.—N. Carolina to Sao Sebastiao, Brazil, 2-640 fms. Pleistocene to Recent. Gulf coast.—Recent: Cedar Keys, Ft. Barranca, Fla.; Horn Island, Miss.; Galveston. Pleistocene: Lake Borgne borings, New Orleans artesian well of 1856, at 41 and 546 feet; New Orleans pumping station No. 7; New Orleans Gymnasium well at 1200 ft., Knapp's wells, Terrebonne Parish at 1600-1700, 2250-2450, No. 2 at 1050-1190, 1190-1430, 1434-1519, 1519-1542, 1542-1632, 1632-1726, 1731-1739, 1780-1790, 1791-1842, No. 3 at 880-990, 1040-1043, 1200-1300, 1330-1375, 1400-1440, 1443-1470, 1470-1480, 1500-1525, 1796-1839 feet.

Genus **DIVARICELLA** von Martens

quadrisulcata d'Orbigny, Voy. Amér. Mér., Moll., p. 584, 1846, (as *Lucina*); Hist. Pol. y N. Isla de Cuba, 2, p. 294, pl. 27, f. 34-36, '53; Dall, Bull. 37, U. S. N. M., p. 50, '89; Proc. U. S. N. M., 23, p. 815, '01; Trans. W. I. S., 3, p. 1389, pl. 51, f. 1, '03; Vanatta, Proc. A. N. S. Phila., 55, p. 757, '03; Johnson, Occ. Papers, Bost. Soc. Nat. Hist., 7, p. 62, 1915.

divaricata Lamarck, An. s. Vert., 5, p. 541, 1818, (as *Lucina*, in part). Not of Linnæus. Tuomey and Holmes, Pleio. Fos. C., p. 59, pl. 17, f. 10-11, '57; Holmes, Post-Pl. Fos. S. C., p. 27, pl. 6, f. 1, '60.

conradi d'Orbigny, '52, *strigilla*, Stimpson, '51, *americana* Adams, '52, not DeFrance, 1823, (all as *Lucina*).

This species has often been confused with the Mediterranean shell, *D. divaricata* Linnæus, and with the larger, recent American species, *D. dentata* Wood.

Distribution.—Nantucket Island to Rio de Janeiro, 10-50 fms. Miocene (Md. and Va.) to Recent. Gulf coast.—Recent. Ft. Barranca and Crooked Isl., Fla. Pleistocene: Teel No. 1 well, Saratoga, Tex., at 940 feet. Upper Miocene. Galveston well at 2552-2600 feet. (Harris, as *dentata*).

chipolana Dall, Tr. W. I., 3, p. 1389, pl. 51, f. 2, 1903.

Distribution.—Miocene of the Chipola marl and Oak Grove sands, Florida; and of the Bascom No. 1 well, Mobile, Ala., at 1500-1556 feet, Bascom No. 2 well, 1241 and 1600 feet.

Genus **DIPODONTA** Bronn

punctata Say, Jour. Acad. Nat. Sci. Phila., 2, p. 308, 1822, (as *Amphidesma*); Dall, Tr. W. I. S., 3, p. 1187, 1900; Proc. U. S. N. M., 23, p. 793, '01; Vanatta, Proc. A. N. S. Phila., 55, p. 757, '03.

subglobosa C. B. Adams, Proc. Bost. Soc. Nat. Hist. 2, p. 298, '47, (*nomen nudum*); Dall, Bull. 37, U. S. N. M., p. 52, '89.

venezuelensis Dunker, Zeit., Mal., 5, p. 184, '48, (as *Lucina*); Novit. Conch. Moll. Mar., p. 3, pl. 4, f. 7-9, '58; Dall, B. M. C. Z., 9, p. 136, '81.

janeirensis Reeve, Conch. Icon., *Lucina*, pl. 8, f. 43, '50, (as *Lucina*).

braziliensis Mittré, Jour. de Conchy., 1, p. 240, pl. 12, f. 7-9, '50. (Not *braziliensis* Philippi).

Mysia pellucida Heilprin, The Bermuda Isls., pp. 179, 190, pl. 17, f. 3, '89.

Distribution—Hatteras to Rio de Janeiro, south through Straits of Magellan to Chiloe Isl., Pacific Ocean. Pliocene (?) to Recent. Gulf coast.—Crooked Isl., Fla.; Horn Isl., Miss., Galveston (?)

semiaspera Philippi, Wiegmann, Arch. 1, p. 225, pl. 7, f. 2 *a-d*, 1836; Dall, Bull. 37, U. S. N. M., p. 52, '89; Mitchell's List Tex. Shells; Dall, Tr. W. I. 3, p. 1188, 1900; Proc. U. S. N. M., 23, p. 794, 1901.

Lucina granulosa C. B. Adams, Proc. Bost. Soc. N. Hist., 2, p. 9, '45.

Lucina semireticulata d'Orbigny, (in part), Voy. Am. MÉR., p. 585, pl. 84, figs. 7-9, '46.

Distribution.—Hatteras to Rio de Janeiro, 14-20 fms. Gulf coast.—Texas (Mitchell); Pliocene: Caloosahatchie.

soror C. B. Adams, Contr. Conch., p. 247, 1852, (as *Lucina*); Dall, Bull. 37, U. S. N. M., p. 52, '89; Tr. W. I., 3, p. 1188, 1900; Proc. U. S. N. M., 23, p. 794, '01.

kiawahensis Holmes, Post-Pl. Fos. S. C., p. 29, pl. 6, fig. 5, 1858; Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, 1878.

Distribution.—Texas to Jamaica. Pleistocene: Lake Borgne borings, La.

notata Dall and Simpson, Bull. U. S. Fish Comm. 1, p. 495, 1901; Dall, Proc. U. S. N. M., 23, p. 974, '01.

Distribution.—Marco, West Fla., to Porto Rico.

Genus **CYRENOIDA** Joannis

floridana Dall, Bull. 37, U. S. N. M., p. 50, 1889, (*Nomen nudum*); The Nautilus, vol. 10, p. 52, Sept. 1896, (Description).

Distribution.—Georgia to West Florida,—at Marco and Charlotte Harbor, in either brackish or tolerably salt marshes. Recent. The Caloosahatchie Pliocene species is *caloosaënsis* Dall.

Genus **THYASIRA** Leach

grandis Verrill and Smith, Trans. Conn. Acad., 6, 1885, (as *Cryptodon*); Dall, Bull. 37, p. 50, pl. 46, f. 22, '89; Proc. U. S. N. M., 23, p. 785, 1901.

Distribution.—Lat. $38^{\circ} 29'$ N., south to Yucatan straits, Gulf of Mexico, 856-1582 fms. Also off France, 820 fms.

granulosa (Jeffreys) Monterosato, Jour. de Conchy., 22, 1874, (as *Axinus*); Dall, Proc. U. S. N. M., 23, p. 785, 1901.

Distribution.—Gulf of Mexico to St. Lucia, W. I., 60-116 fms. Also Mediterranean and off Canaries.

pyriformis Dall, Bull. Mus. Comp. Zool., Harvard Coll., 12, p. 267, 1886.

Cryptodon ? *obesus* Dall, *Idem*, 9, p. 136, '81. Not *obesus* of Verrill, Amer. Jour. Sci., 3, p. 287, pl. 7, f. 2, 1872=*trisinuata* d'Orbigny, 1846.

Distribution.—Carolina to Florida. 85-731 fms. Gulf of Mexico, Yucatan Strait, 640 fms. A thinner, flatter and less earthy shell than that of *T. obesus* (= *trisinuata*).

Genus **ERYCINA** Lamarck

floridana Vanatta, Proc. Acad. Nat. Sci., Phila., vol. 55, p. 758, f. 2, 1903.

Distribution.—West Florida at Crooked Island, Calhoun Co.

Genus **ROCHFORTIA** Vélain

planulata Stimpson, Shells of New England, p. 17, 1851, (as *Kellia*); Verrill, Inv. Vineyard Sound, p. 688, pl. 30, f. 6, '73; Dall, Bull. 37, U. S. N. M., p. 48, '89; Pr. U. S. N. M., 21, p. 890, (as *Mysella*); Tr. W. I. S., 3, p. 1161, pl. 45, f. 7, 1900. Johnson, Occ. Papers, Bost. Soc. Nat. Hist., 7, p. 66, 1915.

Montacuta bidentata Verrill and Bush, Proc. U. S. N. M., 20, p. 779, pl. 93, f. 7, 8 pl. 94, 6, '98. Not *bidentata* Montagu, 1803.

Distribution.—Maine to Hatteras. Variety *fragilis* Verrill and Bush, (Proc. U. S. N. M., 20, p. 780, pl. 92, f. 8, '98), Narragansett Bay, R. I., and Corpus Christi, Tex. Pliocene: Caloosahatchie marl, Fla.

Genus **MONTACUTA** Turton

floridana Dall, Proc. U. S. N. M., 21, p. 893, pl. 87, f. 10, 1899; Tr. W. I., 3, p. 1174, 1900; Vaughan, Publ. 133, Carn. Inst., p. 171, 1910.

Distribution.—Recent ; West Florida near the Manatee River.
 Pleistocene : Osprey, Manatee and Labelle, West Florida.
 Pliocene : Caloosahatchie.

limpida Dall, Proc. U. S. N. M., 21, p. 894, pl. 97, f. 5, 11, 1899.

Distribution.—Type dredged at 85 fms. in the Gulf of Mexico,
 5 miles off Cape Florida.

Genus **SPORTELLA** Deshayes

constricta Conrad, Am. Jour. Sci., 41, p. 347, pl. 2, f. 15, 1841,
 (as *Amphidesma*); Fos. Medial Tert. p. 76, pl. 43, fig. 10,
 1845 ; Dall, Tr. W. I. S., 3, pl. 25, f. 4, 4a, 1898 ; *Idem*,
 p. 1615, 1903.

Distribution.—Miocene of Va. and N. Car. ; Pliocene : Caloosa-
 hatchie and Shell Creek, Fla. ; Pleistocene : North
 Creek, Manatee Co., Fla. Not recorded from the Recent.
 The *Fabella constricta* Dall, Bull. 37, p. 48, '89, was later
 referred to *Anisodonta elliptica* Recluz.

Genus **CARDIUM** Linnæus

(*Trachycardium*) *isocardia* Linnæus, Syst. Nat., ed. X, p. 679,
 1758 ; Chemnitz, Conch. Cab., 6, p. 182, pl. 17, f. 174-176,
 1782 ; Reeve, Conch. Icon., 2, *Cardium*, pl. 17, f. 84,
 1845 ; Holmes, Post-Pl. Fos. S. C., p. 25, pl. 5, f. 4, '60 ;
 Dall, Bull. 37, p. 52, '89 ; Post, Nautilus., 13, p. 23, '99 ;
 Dall, Tr. W. I. S., 3, p. 1085, 1900 ; Vanatta, Pr. A. N.
 S. Phila., 55, p. 757, '03 ; Vaughan, 2d Ann. Rept. Fla.,
 p. 148, '09 ; Publ. 133, Carn. Inst., p. 171, 1910.

egmontianum Shuttleworth, Journ. de Conchyl., 5, p. 472,
 1856.

Distribution.—Hatteras to Trinidad. Miocene to Recent.
 Gulf coast.—Recent : Tampa and St. Joseph's Bays,
 Crooked Isl., Alligator Harbor, Ft. Barranca, Fla. ; Cor-
 pus Christi, Tex. Pleistocene : Osprey, Labelle and
 Manatee, Fla. : New Orleans pumping station No. 7.
 Pliocene : Caloosahatchie.

(*Trachycardium*) *muricatum* Linnæus, Syst. Nat., ed. X, p. 680,
 1758 ; Reeve, Conch., Icon., 2, *Cardium*, pl. 6, f. 33, 1844 ;

Holmes, Post-Pl. Fos. S. C., p. 24, pl. 5, f. 3, '60; Dall, Bull. 37, U. S. N. M., p. 52, '89; Singley, 4th Ann. Rept. Tex., p. 327, '92; Dall, Tr. W. I. S., 3, p. 1089, 1900; Vanatta, Proc. A. N. S. Phila., 55, p. 757, '03. Not of Tuomey and Holmes, 1857.

campechiense Boltén, Mus. Bolt., p. 191, 1798; *gossei* Deshayes, 1854; *æquilaterale* Hilgard, 1878.

Distribution.—Hatteras to Brazil. Usually very shallow water. Pleistocene to Recent. Gulf coast.—Indian Pass, St. Joseph's Bay, Fla.; Chandeleurs, La.; Galveston, Corpus Christi and Espiritu Santo Bays, Tex., Campeche, (type locality). Pleistocene: New Orleans pumping station No. 7, Lake Borgne borings, (Hilgard's *æquilaterale*).

(*Cerastoderma*) *robustum* Solander, Portland Cat., p. 58, 1786, Dall, Tr. W. I. S., 3, p. 1099, 1900; Proc. U. S. N. M., 23, p. 386, '01; Vanatta, P. A. N. S., Phila., 55, p. 757, '03; Vaughan, 2d Ann. Rept. Fla. Surv., p. 149, 1909.

ventricosum Bruguière, Ency. Méth. I, p. 228, 1789.

magnum Born, Ind. Mus. Vind., p. 34; Test. Mus. Vind., p. 46, pl. 3, fig. 5, 1780; Reeve, Conch. Icon. 2, *Cardium*, pl. 4, f. 20, 1844; Holmes, Post-Pl. Fos. S. C., p. 23, pl. 5, f. 2, 2 a, '60; Hilgard, Rept. Chief of Engineers to Sec. of War, p. 358, 1870; Dall, Bull. 37, U. S. N. M., p. 52, '89; Singley, 4th Ann. Rept. Tex., p. 327, '92; Harris, Bull. Am. Pal. vol. 1, p. 91, '95; Mitchell, List Texas Sh. Not *magnum* Linnæus, Syst. Nat., ed. X, p. 680, 1758.

inæquilaterale Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 889, 1878.

Distribution.—New Jersey to Campeche. Upper Miocene to Recent. Gulf coast.—Recent: Ft. Barranca, St. Mark's, St. Andrew's Bay, Indian Pass, Crooked Island, Fla.; Horn Island, Miss.; Cameron, Chandeleurs, La.; Galveston, Padre Island, Corpus Christi, Tex. Pleistocene: Labelle, Osprey and Manatee, Fla.; New Orleans well of 1856 at 41 feet, Grand Chénier, Lake Borgne borings (?),

New Orleans Gymnasium well at 1200 feet, Knapp's wells, Terrebonne Parish No. 1 at 2000-2150, 2250-2450, No. 2 at 1190-1430, 1791-1842, No. 3, 1200-1300 feet. Pliocene: Caloosahatchie and Shell Creek, Fla. Upper Miocene; Galveston well at 2552-2600 feet (Harris).

- (**Fragum**) **medium** Linnæus. Syst. Nat., ed. X, p. 678, 1758; Reeve, Conch. Icon., 2, *Cardium*, pl. 6, f. 30, 1844; Dall, Bull. 37, U. S. N. M., p. 52, '89; Tr. W. I. S., 3, p. 1101, 1900; Proc. U. S. N. M., 23, p. 386, '01; Glenn, Miocene, Md. Geol. Surv., p. 322, pl. 86, f. 6 a, 6 b, 1904.
Hemicardium columba Heilprin, Tr. W. I. S., 1, p. 93, pl. 11, f. 26, 1886.

Distribution.—North Carolina to Santa Marta, Brazil, 2-15 fms. Miocene (Md. and N. Car.) to Recent. Gulf coast.—W. Florida. Pliocene: Caloosahatchie and Shell Creek.

- (**Trigoniocardia**) **galvestonense** Harris, Bull. Am. Pal., 1, No. 3, p. 91, pl. 1, f. 3, 3 a, 1895; Olsson, Nautilus, 7, p. 102, pl. 6, f. 8, 9, 11, 12, Jan., 1914.

Distribution.—Miocene of the Galveston well at 2443-2871 feet (Harris), and of the Choptank River, Maryland. (Olsson).

- (**Trigoniocardia**) **apateticum** Dall, Tr. W. I. S., 3, p. 1105, pl. 40, f. 15, pl. 48, f. 6, 1900.

Distribution.—Miocene of Oak Grove, Santa Rosa Co., Fla., and of the Mobile Oil Co.'s No. 1 well, Mobile, Ala., at 1500-1556 feet, No. 2 well, Bascom, at 1241 feet.

- (**Papyridea**) **spinosum** Meuschen, Mus. Gevers, p. 442, 1787, (as *Cardia*); Dall, Tr. W. I. S., 3, p. 1106, 1900; Proc. U. S. N. M., 23, p. 387, '01.

bullatum of many authors but not of Linnæus.

soleniforme Bruguière, Enc. Méth., Vers., 1, p. 235, 1789; Wood, Gen. Conch., p. 233, pl. 56, f. 3, 1815.

Note.—Meuschen's description of *spinosum*, according to Dr. Dall, was based on a figure by Lister of a Jamaican shell. The Pacific form *aspersum* Sowerby is exceedingly close to this Atlantic species.

Distribution.—Hatteras to Santa Marta, Brazil, 2-300 fms. Pleistocene to Recent. West Florida.

(*Lævicardium*) *serratum* Linnæus, Syst. Nat., ed. X, p. 680, 1758; Holmes, Post.-Pl. Fos. S. C., p. 25, pl. 5, f. 5, 1860; Dall, Bull. 37, U. S. N. M., p. 54, '89; Tr. W. I. S., 3, p. 1110, 1900; Vanatta, Proc. A. N. S. Phila., 55, p. 757, '03; Vaughan, 2d Ann. Rept. Fla. Surv., p. 149, '09; Maury, Bull. Am. Pal. No. 29, p. 212, pl. 36, f. 8, 1917.

citrinum Wood, Gen. Conch., p. 223, pl. 54, f. 3, 1815.

lævigatum Lamarck, An. s. Vert., pt. 1, p. 11, 1819. Not of Born, 1780, nor of Linn. 1758.

oviputamen Reeve, Conch. Icon., *Cardium*, pl. 7, f. 36, 1844.

pictum Ravenel, Proc. Acad. Nat. Sci. Phila., p. 44, 1861.

Distribution.—Hatteras to Bahia, Brazil, 1-100 fms. Miocene to Recent. Gulf coast.—Recent: Indian Pass, St. Joseph's Bay, Crooked Island, Fla.; Horn Island, Miss.; Cameron, La.; Mustang Island, Tex. Pleistocene: Manatee, Fla.; New Orleans pumping station No. 7. Pliocene: Caloosahatchie.

(*Lævicardium*) *mortoni* Conrad, Jour. Acad. Nat. Sci. Phila., 6, p. 259, pl. 10, f. 5-7, 1830; Holmes, Post-Plio. Fos. S. C., p. 26, pl. 5, f. 6, '60; Dall, Proc. U. S. Nat. Mus., 6, p. 341, '83; Gould, Binney's ed., p. 143, f. 453, '70; Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 888, '78; Dall, Bull. 37, U. S. Nat., p. 54, pl. 58, f. 8, '89; Singley, 4th Ann. Rept. Tex., p. 327, '92; Dall, Tr. W. I. S., 3, p. 1111, '00; Mitchell, List Tex. Sh.; Vanatta, Pr. A. N. S. Phila., 55, p. 757, '03; Vaughan, Publ. 133, Carn. Inst., p. 171, '10; Johnson, Occ. Papers, Bost. Soc., N. H., 7, p. 68, 1915.

Distribution.—Nova Scotia to Santa Marta, Brazil, 1 foot to 5 fms. Miocene to Recent. Gulf coast.—Cedar Keys, St. Mark's, Ft. Barranca, St. Andrew's Bay, Fla.; Galveston, Corpus Christi, Port Lavaca, Espiritu Santo Bay,

Tex. Pleistocene: Labelle and Osprey, Fla., New Orleans well of 1856, Lake Borgne borings. Pliocene: Caloosahatchie and Shell Creek, Fla.

Genus **PROTOCARDIA** Beyrich

peramabilis Dall, B. M. C. Z., 9, p. 132, 1881, (as *Fulvia*); *Idem*, 12, p. 269, pl. 4, f. 7, '86; Bull. 37, U. S. N. M., p. 52, pl. 4, f. 7, pl. 40, f. 4, '89; Proc. U. S. N. M., 23, p. 388, '01; Johnson, Occ. Papers, Bost. Soc. Nat. Hist., 7, p. 69, 1915.

Distribution.—Rhode Island to Grenada, W. I., 18-164 fms. Gulf of Mexico, west of Florida, 50 fms. The ancestral form of this very lovely deep sea shell appears to be *P. islahispaniolæ* Maury, from the Dominican Miocene.

Genus **DOSINIA** Scopoli

discus Reeve, Conch. Icon., 6, pl. 2, f. 9, 1850, (as *Artemis*); Deshayes, Cat. Conch. Brit. Mus., p. 10, '53; Tryon, Am. Marine Conch., p. 161, pl. 30, p. 399, '73; Dall, Bull. 37, U. S. N. M., p. 56, pl. 89, fig. 1, pl. 90, fig. 1, '89; Singley, 4th Ann. Rept. Tex., p. 328, '92; Dall, Proc. U. S. N. M., 26, p. 366, '03; Tr. W. I. S., 3, p. 1232, '03; Vanatta, Proc. A. N. S., Phila., 55, p. 757, 1903.

concentrica Conrad, Am. Marine Conch., p. 55, pl. 12, 1831; Am. Jour. Sci., 2d Ser., 2, p. 393, 1846; Holmes, Post-Pl. Fos. S. C., p. 37, pl. 7, fig. 4, 1860; Hilgard, House of Rep. Ex. Doc., 1, pt. 2, p. 887, 1878. Not *Venus concentrica* Born, 1780.

Distribution.—New Jersey to Vera Cruz. Pliocene to Recent. Gulf coast.—Recent: Ft. Barranca, St. Joseph's Bay, Crooked Island, &c., Fla.; Horn Island, Miss.; Point au Fer, Chandeleurs, La.; Galveston, Corpus Christi, Tex. Pleistocene: Osprey, Fla.; Grand Chénier (?), New Orleans artesian well of 1856 at 546 feet, Lake Borgne borings (Hilgard's *concentrica*), New Orleans pumping station No. 7, New Orleans Gymnasium well at 1200 feet,

Knapp's wells, Terrebonne Parish, No. 1 (?), 1600-1700 feet, No. 2, 1519-1542, No. 3 at 570-700, 880-900, 1330-1375, 1400-1440, 1700-1712 feet.

elegans Conrad, Proc. A. N. S. Phila., 1, p. 325, 1843, (as *Artemis*); Fos. Medial Tert., p. 67, pl. 38, f. 1, 1845; Am. Jour. Sci., 2d Ser., II, p. 393, 1846; Dall, Tr. W. I. S., 3, p. 1231, 1903; Vaughan, Publ. 133, Carn. Inst., p. 171, 1910. *concentrica* Reeve, Conch. Icon. 6, pl. 2, f. 1, 1850; Tuomey and Holmes, Plio. Fos. S. C., p. 82, pl. 21, fig. 7, '55. Not *concentrica* Born, 1780.

transversa Emmons, 1858; *intermedia* Conrad, 1863.

Distribution.—Hatteras to Yucatan. Miocene to Recent. Gulf coast.—Tampa, Fla. (Conrad's locality); Texas. Pleistocene: Osprey and Labelle, Fla. Pliocene: Caloosahatchie and Shell Creek.

Genus **TRANSENNELLA** Dall

conradina Dall, Proc. U. S. N. M., 6, p. 340, '83; *Idem*, 24, p. 509, pl. 31, f. 5, 7, 1902; Vanatta, Proc. A. N. S. Phila., p. 757, '03, (as *Meretrix*); Dall, Tr. W. I. S., 3, pp. 1240, 1616, '03.

Distribution.—Hatteras to Key West, 0.31 fms. Pleistocene to Recent. Gulf coast.—Cedar Keys, (type locality), St. St. Joseph's and St. Andrew's Bays, Crooked Island, St. Mark's, W. Fla. Pleistocene: Osprey, Fla.

Genus **GAFRARIUM** Bolten

(**Gouldia**) **cerina** C. B. Adams, Proc. Bost. Soc., N. H., p. 9, 1845, (as *Thetis*); Cat. Jamaican Sh., p. 29, '47; Dall, B. M. C. Z. 9, p. 130, '81; *Idem*, 12, p. 263, pl. 7, f. 4 *a-b*, '86; Bull. 37, p. 48, pl. 7, f. 4 *a-b*, '89; Proc. U. S. N. M., 26, p. 369, 1903.

Distribution.—Hatteras to Brazil, 0-229 fms. Gulf coast.—Charlotte Harbor, Fla., 13 fms.

Genus **MACROCALLISTA** Meek

nimbosa Solander, Portland Cat., p. 175, 1786, (as *Venus*); Whitfield and Hovey, Bull. Am. Mus. Nat. Hist., 11, p. 462,

1901; Vanatta, Proc. A. N. S. Phila., 55, p. 757, '03;
Dall, Tr. W. I. S., 3, p. 1254, '03; Vaughan, Publ. 133,
Carn. Inst., p. 171, 1910.

gigantea Chemnitz, Conch Cab. 10, p. 354, pl. 171, f. 1661,
1788; Gmelin, Syst. Nat., 6, p. 3282, 1792; Lamarck,
An. s. Vert. 5, p. 564, 1818; DeKay, Zool. New York,
Moll., p. 216, '43; Conrad, Am. Jour. Sci., p. 44, '46;
Sowerby, Thes. Conch. 2, p. 628, pl. 131, f. 86, '51;
Holmes, Post-Plio. Fos. S. C., p. 36, pl. 7, f. 3, '60;
Reeve, Conch. Icon., 14, *Dione*, pl. 5, f. 17, '63; Coyes,
Proc. A. N. S., Phila., p. 136, '71; Dall, Bull. 37, U. S.
N. M., p. 56, '89; Singley, 4th Ann. Rept. Tex., p. 327,
'92; Mitchell, List Tex. Sh.

Distribution.—Hatteras to Cuba (?) Pliocene to Recent.
Gulf coast.—Recent: Ft. Barranca, Fla, Mobile, Ala.,
Matagorda Bay, Tex. Pleistocene: Osprey, Orient and
Labelle, Fla. Pliocene: Caloosahatchie beds.

(*Paradione*) *maculata* Linnæus, Syst., Nat. ed. X, p. 686, 1758,
(as *Venus*); Lamarck, An. s. Vert., 5, p. 566, 1818; Sowerby,
Conch. Man., fig. 117 *d*, '42; Thes. Conch. 2, p. 629, pl.
131, f. 97, '51; Gabb, Jour. A. N. S. Phila., 2d Ser., 8,
p. 344, '81; Dall, Tr. W. I. S., 3, p. 1256, 1903.

Cytherea dariena Conrad, Pac. R. R. Rept. 6, p. 72, pl. 5,
f. 21, 1857. Not *Meretrix dariena* Conrad, which is
Clementia dariena.

Distribution.—Hatteras to Brazil. Miocene to Recent. Gulf
coast.—Recent: Ft. Barranca, St. Joseph's Bay, Crooked
Island, etc., Fla.; Horn Island, Miss.; Chandeleurs, La;
Matagorda Bay, Mustang Island, Corpus Christi, Texas.
Pliocene: Caloosahatchie. Miocene: Chipola marl, Cal-
houn Co.; Oak Grove sands, Santa Rosa Co., Fla.; Bas-
com well, Mobile, Ala. at 1241 feet.

Genus **CALLOCARDIA** A. Adams

vesica Dall, Bull. Mus. Comp. Zool. Harv. Coll., 12, p. 275, 1886,
(as *Cytherea*); Bull. 37, U. S. N. M., p. 56, '89; Proc. U.

S. N. M., 12, p. 270, pl. 14, f. 8, 12, '89; *Idem*, 26, p. 370, 1903.

Distribution.—Gulf of Mexico, 84 fms., Guadeloupe, 175 fms., Barbados, 100 fms. Dredged, S. S. Hassler.

(*Agriopoma*) *texasiana* Dall, Nautilus, 5, No. 12, p. 134, 1892, (as *Cytherea*); Bull. 37, U. S. N. M., 2d ed., pl. 93, f. 1; Proc. U. S. N. M., 24, p. 509, pl. 32, f. 1, 1902; Vanatta, Proc. A. N. S. Phila., 55, p. 757, '03; Dall. Proc. U. S. N. Mus., 26, p. 370, '03.

idonea ? (Conrad) Dall, Bull. 37, U. S. N. M., p. 56, 1889.

Distribution.—Gulf of Mexico. Recent : Indian Pass, Calhoun Co., Fla.; Cameron, Point au Fer, Chandeleurs, La.; Galveston, Indianola, Tex. Pleistocene : Grand Chénier, Knapp's wells, Terrebonne Parish, No. 2 at 1542-1632, No. 3 at 570-700.

(*Agriopoma*) *morruhana* Linsley, Am. Jour. Sci., 1st ser., 48, p. 276, 1845, (*Nomen nudum*); Gould, *Idem*, 2d ser., 6, p. 233, 1848; Dall, Pr. U. S. N. M., 26, p. 370, 1903; Tr. W. I. S., p. 1262, pl. 54, f. 14, 1903; Johnson, Occ. Papers, Bost. S. N. H., 7, p. 69, 1915.

convexa Conrad, Jour. A. N. S. Phila., 6, p. 261, 1831, (as *Cytherea*); Gould, Inv. Mass., p. 84, pl. 3, fig. 49, 1841; DeKay, Nat. Hist. N. Y., Moll., 5, p. 216, pl. 27, f. 279, '43; Reeve, Conch. Icon., 14, pl. 10, f. 40, 1863. Not *convexa* Say, which is *Callocardia sayana* Conrad, and known only in the fossil state. Not *convexa* of Brongniart, 1811 (in Cuvier's, "Ossements fossiles," 2, pt. 2, pl. 8, f. 7), which is a doubtful French species identified by Renevier and Deshayes with *Cyrena semistriata* Deshayes, 1831.

sayi Perkins, Proc. Bost. Soc. Nat. Hist., 13, p. 147, 1869.

Distribution.—Prince Edward's Island to Hatteras, 2-63 fms. Miocene to Recent. Characteristically a cold water species, but cited from the Gulf coast at Tampa (Dall, '89). Tampa shell perhaps *texasiana*.

(*Agriopoma*) *zonata* Dall, Proc. U. S. N. M., 26, pp. 370, 381, pl. 12, f. 4, 1903.

Cytherea ? *obovata* (Conrad) Dall, Bull. 37, U. S. N. M., p. 56, 1889.

Distribution.—Off Hatteras, 18-22 fms. Gulf coast.—West Florida and Cameron, La. (Dall).

Genus PITARIA Romer

simpsoni Dall, Bull. 37, U. S. N. M., p. 56, 1889 ; (*Nomen nudum*) ; Nautilus 9, No. 1, p. 10, 1895, (as *Cytherea*) ; Proc. U. S. N. M., 24, p. 510, pl. 32, f. 3, 1902, (as *Meretrix*) ; *Idem*, 26, p. 371, 1903 ; Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903.

Distribution.—Florida to Martinique, 0-26 fms. Pliocene to Recent. Gulf coast.—St. Joseph's Bay and Crooked Isl., Calhoun Co., Tampa and Sarasota Bays, Fla.

eucymata Dall, Proc. U. S. N. M., 12, p. 271, pl. 13, f. 11, '89 ; *Idem*, 26, p. 371, 1903 ; Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903.

Cytherea sp., (No. 290), Dall, Bull. 37, p. 56, '89.

Distribution.—Hatteras to Brazil, 20-111 fms. Gulf coast.—Horn Island, Miss., and dredged between the Mississippi delta and Cedar Keys, 111 fms.

fulminata Menke, Synop. Moll. Mus. Menkeano, 2d ed., 1830 ; Dall, Proc. U. S. N. M., 26, p. 371, 1903. Not of Philippi, 1845.

Cytherea hebræa Lamarck, An. s. Vert. 6, p. 308, 1818 ; Dall, B. M. C. Z., 12, p. 275, 1886 ; Bull. 37, U. S. N. M., p. 56, '89.

Circe hebræa Reeve, Conch. Icon., 14, pl. 8, f. 34, '63.

varians Hanley, 1844 ; *rubiginosa* Philippi, 1845.

Distribution.—Hatteras to Brazil, 0-170 fms. Gulf coast.—West Fla., 30 fms.

Note.—The identity of *hebræa* Lam. with *fulminata* Menke is based on Krieb's statement.

(*Hysteroconcha*) *dione* Linnæus, Syst. Nat. ed. X, p. 684, 1758 ;

Dall, Bull. 37, U. S. N. M., p. 56, '89; Dall and Simpson, Bull. U. S. Fish Comm., 1; p. 485, pl. 56, f. 3, 10, '01; Dall, Proc. U. S. N. M., 26, p. 371, 1903.

Dione veneris Deshayes, Cat. Conchifera Brit. Mus., pt. 1, 1853; Reeve, Conch. Icon., 12, *Dione*, pl. 6, f. 23, 1863.

Distribution.—Gulf of Mexico, Texas coast, to Colon and Trinidad. Type of subgenus *Hysteroconcha* Fischer.

Genus CYTHEREA Boltén

listeri Gray, Analyst, 8, No. 24, 1838, (as *Dosinia*); Reeve, Conch. Icon. 12, *Venus*, pl. 5, f. 14, '63; Dall, Proc. U. S. N. M., 26, p. 372, 1903.

Venus crispata Dall, Bull. 37, U. S. N. M., p. 54, 1889. Not of Deshayes, 1853.

Distribution.—Gulf of Mexico to Santo Domingo, Tortola and the Virgin Isls. Gulf coast.—West Florida.

Genus ANTIGONA Schumacher

(*Ventricola*) *rugatina* Heilprin, Tr. Wagner Inst. Sci., 1, p. 92, pl. 11, f. 24, 1887, (as *Venus*); Dall and Simpson, Bull. U. S. Fish Com., 1, p. 483, 1901; Dall, Proc. U. S. N. M., 26, p. 372, '03; Tr. W. I. S., 3, p. 1277, '03.

rugosa var. *rugatina* Dall, Bull. 37, p. 54, '89.

Distribution.—Hatteras to Porto Rico, 26-84 fms. Pliocene to Recent. Gulf coast.—Tampa, Fla. Pliocene: Caloosahatchie.

(*Ventricola*) *callimorpha* Dall, Proc. U. S. N. M., 26, pp. 372, 382, pl. 13, f. 6, 1903.

pilula Dall, B. M. C. Z., 9, p. 136, '81, (as *Diplodonta*); *Idem*, 12, p. 274, pl. 8, f. 13, '86, (as *Callocardia*); Bull. 37, U. S. N. M., p. 54, '89, (as *Venus*). Not *pilula* of Reeve, 1863.

Distribution.—Gulf of Mexico (Dall, '89) to Barbados, 76-300 fms.

Genus CYCLINELLA Dall

tenuis Récluz

Dosinia (*Artemis*) *tenuis* Récluz, Jour. de Conchy., 3, p.

250, pl. 10, f. 1, 1', 1852. Not *Artemis tenuis* Sowerby, 1852.

Cyclina tenuis Beau, Cat. Coq. Guadeloupe, p. 24, '58.

Mysia tenuis Dall and Simpson, 1901.

Lucinopsis kroyeri Poulsen, '78, (not of Philippi); *gundlachi* Dunker, '78; *tenuis* Dall, Bull. 37, p. 56, '89.

Cyclinella tenuis Dall, Tr. W. I. S., p. 1285, 1903.

Distribution.—Florida to Sao Paulo, Brazil, 0-8 fms. Pliocene to Recent. Gulf coast.—Texas and Cedar Keys, Fla. Pliocene: Caloosahatchie. Type locality Pointe-à-Petre, Guadeloupe.

Genus **CHIONE** Megerle

cancellata Linnæus, Syst. Nat., ed. XII, p. 1130, 1767, (as *Venus*); Sowerby, Thes. Conch., 2, p. 710, pl. 54, f. 28-31, 1853; Hilgard, Rept. Chief of Engineers to Sec. of War, p. 358, '70; Dall, Bull. 37, U. S. N. M., p. 54, '89; Singley, 4th Ann. Rept. Tex., p. 327, 1892; Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903; Mitchell, List Tex. Sh.

Chione cancellata Holmes, Post-Pl. Fos. S. C., p. 35, pl. 6, f. 14, '60; Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, '78; Harris, Bull. Am. Pal. 1, No. 3, p. 92, '95; Dall, Tr. W. I. S., 3, p. 1290, 1903; Vaughan, 2d Ann. Rept. Fla. Surv., p. 148, 1909.

Venus cigenda Dillwyn, Cat. Rec. Shells, p. 161, 1817.

elevata Say, Jour. Acad. Nat. Sci. Phila., 1, p. 272, 1822; *lamellata* Deshayes, 1853, not of Linnæus; *ziczac* Krebs, not Linnæus.

Distribution.—North Carolina to Brazil, shallow water. Upper Miocene (?) to Recent. Gulf coast.—Recent: Ft. Barranca, St. Joseph's Bay, Crooked Isl., Cedar Keys, Fla.; Horn Isl., Miss.; Galveston, Corpus Christi and Pt. Isabel, Texas. Pleistocene: Osprey, Manatee, Labelle, Orient, Fla.; New Orleans artesian well of 1856, Lake Borgne borings, New Orleans pumping station No. 7, New Orleans Gymnasium well at 1200 feet, Knapp's wells,

Terrebonne Parish, No. 1 at 2250-2450, No. 2 at 1731-1739, No. 3 at 570-700; 1150-1200, 1200-1300, 1330-1375, 1400-1440, 1443-2470, 1500-1525 feet. Pliocene: Caloosahatchie. Upper Miocene: Galveston well at 1550-2871 feet (Harris).

Note.—Dr. Dall doubts whether this species descends into the Miocene. The Galveston shell may be an ancestral form.

intapurpurea Conrad, Jour. A. N. S., Phila., 1, new ser., p. 209, 1849, (as *Venus*); Dall, Tr. W. I. S., 3, p. 1293, 1903; Proc. U. S. N. M., 26, p. 374, '03.

Chione cribraria Holmes, Post-Pl. Fos. S. C., p. 35, pl. 6, f. 15, 1860; Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, '78; Dall, Bull. 37, U. S. N. M., p. 54, '89, (as *Venus*); Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903. Not *Venus cribraria* Conrad, Pr. A. N. S. Phila., 1, p. 310, 1843; Fos. Med. Tert., p. 67, pl. 38, f. 2, 1845.

Venus punctulata Conrad, 1843, not of Valenciennes; *V. lacunata* Reeve, 1863.

Note.—True *Chione cribraria* is Upper Miocene, *cortinaria*, Lower Miocene, *intapurpurea*, Pliocene to Recent. These form a phylogenetic series.

Distribution.—Hatteras to Honduras, 18-124 fms. Gulf coast. Recent: Ft. Barranca, Crooked Isl., St. Joseph's Bay, Fla.; Horn Island, Miss.; Texas. Pleistocene: New Orleans artesian well of 1856, at 41 & 225 feet; New Orleans Gymnasium Club well at 1200 feet; Lake Borgne borings, New Orleans pumping station No. 7, Knapp's wells, Terrebonne Parish, No. 2, 1050-1190, No. 3, 700-780, 790-830, 1040-1043 feet. Pliocene of Fla.

(*Lirophora*) *burnsi* Dall, Tr. W. I. S., 3, p. 1198, pl. 62, f. 4, 11, 1900, (as *Venus*); *Idem*, p. 1294, 1906.

Distribution.—Miocene of the Chipola marl and Oak Grove sands, West Florida, and of the Bascom No. 1 well, Mobile, Ala., at 1500-1556 feet, Bascom No. 2 well, at 1241 ft.

(*Lirophora*) *latilirata* Conrad, Proc. A. N. S. Phila., 1, p. 28, 1841, (as *Venus*); Fos. Med. Tert., p. 68, pl. 38, f. 3,

'45; Tuomey and Holmes, *Pleio. Fos. C.*, p. 85, pl. 21, f. 12, 1857; Dall, *Tr. W. I.*, 3, p. 1198, pl. 42, f. 3, 1900; p. 1298, 1903.

paphia Lamarck, *An. s. Vert.*, 5, p. 608, 1818, (as *Venus*); Hilgard, *Rept. Chief Engineers to Sec. War*, p. 358, 1870. Not of Linnæus, *Syst. Nat.*, ed. 12, p. 1129, 1767.

alveata Say, *Am. Conch.* 7, pl. 63, 1833. Not of Conrad, 1831.

varicosa Sowerby, *Thes. Conch.* 2, p. 723, pl. 155, f. 67, 1853; Dall, *Bull.* 37, *U. S. N. M.*, p. 54, '89, (as *Venus*).

athleta Conrad, 1864. (as *Circumphalus*).

Note.—The type locality of Conrad's *V. latilirata* was the Miocene of Calvert Cliffs, Maryland. Conrad laid stress upon the irregularity of the ribs (one being usually very wide), of the Miocene specimens, and we have noticed this peculiarity strongly in specimens from great depths in the deep wells. It cannot, however, be taken as an invariable characteristic, for the regularly ribbed type, which is rather more characteristic of the Recent, occurs also in the Miocene.

Distribution.—Hatteras to Rio Grande do Sul, Brazil, 10-124 fms. Miocene to Recent. Gulf coast.—Recent: West Fla.; Cameron, La., Galveston. Pleistocene: New Orleans artesian well of 1856 at 480 feet, Lake Borgne borings, New Orleans Gymnasium well at 1200 feet. Pliocene: Caloosahatchie marl, Fla. Pleistocene to Upper Miocene (?): Knapp's No. 1 well, Terrebonne Parish, at 2000-2150, 2250-2450, 2443 feet.

(*Lirophora*) *ulocyma* Dall, MS. in coll., *U. S. N. M.*; Harris, *Bull. Am. Pal.*, 1, No. 3, p. 91, 1895; Dall, *Tr. W. I. S.*, 3, p. 1296, pl. 42, f. 5, '03.

Distribution.—Miocene of Alum Bluff (upper bed), Calhoun Co., Fla., and south of Tallahassee, (Vaughan) and of the Galveston well at 2236-2650 feet (Harris).

(*Timoclea*) *grus* Holmes, *Post-Pl. Fos. S. C.*, p. 37, pl. 7, f. 5, 1858, (as *Tapes*); Dall, *Tr. W. I. S.*, 3, p. 1299, 1903.

parva Sowerby, *Thes. Conch.*, 2, p. 787, pl. 168, f. 227,

228, 1854. Not of Sowerby, 1829 ; nor Munster, 1836.

trapezoidalis Kurtz; Cat. Sh. N. & S. Car., p. 5, 1860.

pygmæa Hilgard, House of Rep., Ex. Doc. 1, pt. 2, pp. 887, 890, pl. 3, f. 1, 1878, (as *Tapes*); Dall, (in part), Bull. 37, U. S. N. M., p. 54, '89, (as *Venus*); Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903. Not *pygmæa* of Lamarck, An. s. Vert., 2d ed. 6, p. 337, 1818.

Note.—The true *pygmæa* Lam., of the Florida reefs and Antilles is closely related but larger than *grus*. Its synonym is *V. inæquivalvis* d'Orbigny, 1853.

Distribution.—Hatteras to Yucatan, 12-63 fms. Miocene to Recent. Gulf coast.—Recent : Ft. Barranca, St. Joseph's Bay, Crooked Island, Fla. ; Horn Island, Miss. Pleistocene : New Orleans pumping station No. 7, New Orleans Gymnasium well at 1200 feet ; Knapp's No. 2 well, Terrebonne Parish, 1434-1519, 1542-1632, 1780-1790, 1791-1842 feet ; Bush-Johnson well at Logtown, Miss., at 280 feet. Pliocene : Caloosahatchie and Shell Creek, Fla.

Genus **ANOMALOCARDIA** Schumacher

brasiliiana Gmelin, Syst. Nat. 6, p. 3289, 1792, (as *Venus*); Dall, Proc. U. S. N. M., 26, p. 375, 1903 ; Tr. W. I. S., 3, p. 1306, '03.

flexuosa Born, Test. Mus. Vind., p. 62, pl. 4, f. 10, 1780, (as *Venus*). Not of Linnæus, 1767.

macrodon Lamarck, An. s. Vert., p. 580, 1818 ; Hanley, Bio. Sh., p. 116, pl. 9, f. 7, 1843 ; Sowerby, Thes. Conch., 2, p. 717, pl. 156, f. 88, 1853.

lunularis Lamarck, 1818, Deshayes, '34, Philippi, '44.

Distribution.—North Carolina to Rio de Janeiro. Gulf coast. Pleistocene : Osprey, West Fla. (Dall). Pliocene : Shell Creek, South Fla.

cuneimeris Conrad, Proc. A. N. S. Phila., vol. 3, p. 24, pl. 1, f. 13, 1846, (as *Venus*); Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 890, pl. 3, f. 5, '78 ; Dall, Proc. U. S. N. M., 26, p. 376, '03 ; Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903.

rostrata Sowerby, Thes. Conch., 2, 1853; Dall, Bull. 37, U. S. N. M., p. 54, '89; Singley, 4th Ann. Rept. Tex., p. 327, 1892.

flexuosa Chenu, 1862. Not of Linnæus, 1767, nor of Born, 1780.

punctifera Gray (in Sowerby's Thes. Conch., 2), 1853.

Distribution.—Florida to Colombia. *Fide* Dall, '03, not yet authentically reported from the Antilles. Gulf coast.—Recent: Tampa (Conrad's type locality), Galveston and Corpus Christi. Pleistocene: New Orleans artesian well at 1200 feet; New Orleans well of 1856 at 41 feet.

caloosana Dall, Tr. W. I. S., 3, p. 1198, pl. 43, f. 10, 1900, (as *Venus*); p. 1305, '03; Vaughan, 2d Ann. Rept., Fla., p. 148, '09; Publ. 133, Carn. Inst., p. 171, '10.

Distribution.—Pliocene: Caloosahatchie beds. Pleistocene: Osprey, Orient, Labelle, Manatee, West Fla. Not reported from the Recent.

Genus **VENUS** Linnæus

mercenaria Linnæus, Syst., Nat. ed. X, p. 686, 1758; Gmelin, Syst. Nat. 6, p. 3271, 1792; Lamarck, An. s. Vert., 5, p. 591, 1818; Say, Jour. A. N. S. Phila., 2, p. 271, '22; DeKay, Zool. New York, 5, p. 217, pl. 27, f. 276, '43; Reeve, Conch. Icon., 14, *Venus*, pl. 2, f. 46, '63; Dall, Bull. 37, U. S. N. M., p. 54, pl. 55, f. 7, pl. 71, f. 1, 3, '89; Singley, 4th Ann. Rept. Tex., p. 327, '92; Harris, Bull. Am. Pal. vol. 1, No. 3, p. 91, '95; Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903; Dall, Tr. W. I. S., 3, p. 1311, '03.

Mercenaria violacea Schumacher, Essai, p. 135, pl. 10, f. 3, 1817; Holmes, Post-Pl. Fos. S. C., p. 33, pl. 6, f. 11, '60.

cancellata Gabb, 1860; Conrad, '63; Whitfield, '95. Not *cancellata* Linnæus, 1758.

antiqua Verrill, 1875. Not of King, 1831.

Distribution.—Gulf of St. Lawrence to Florida and Texas. Miocene to Recent. Gulf coast.—Recent: Cedar Keys, St. Mark's, Ft. Barranca, St. Joseph's Bay, Fla.; Point au Fer, Chandeleurs, La.; Galveston, and Corpus Christi,

Tex. Pleistocene: New Orleans well of 1856, 41 feet, Lake Borgne borings, Grand Chênier, Knapp's wells, Terrebonne Parish, No. 2 at 1050-1190, 1542-1632, 1791-1839, No. 3 at 570-700, 1400-1550 feet. Upper Miocene: Galveston deep well at 2236-2600 feet (Harris).

Note.—It was from the violet margins of *V. mercenaria* that the Indians of the East coast made the discs of purple wampum which was more costly than the white.

campechiensis Gmelin, Syst. Nat. 5, p. 3287, 1792; Dall, Tr. W. I. S., 3, p. 1315, 1903; Vaughan, Publ. 134, Carn. Inst., p. 171, 1910.

præparca Say, 1822; *mortoni* Conrad, 1837; Holmes, Post-Pl. F. S. C., p. 34, pl. 6, f. 12, 1858; *calcareæ* Philippi, 1844; *tenuilamellata* Sowerby, 1853; *alboradiata* Sowerby, 1853, Reeve, Conch. Icon., pl. 3, f. 7, 1863; *tetrica* Conrad, 1838; *permagna* Conrad, 1838, Tuomey and Holmes, Pleio. Fos. S. C., p. 86, pl. 22, f. 2, 1856; *capax* Conrad, 1863; *submortoni* d'Orbigny, 1852; *obtusa*, '66, *cuneata*, '68, and *carolinensis*, '75, Conrad.

Distribution.—Chesapeake Bay to Yucatan, moderate depths. Miocene to Recent. Gulf coast.—Recent: Indian Pass, Crooked Isl., Cedar Keys, Fla.; Horn Isl., Miss.; Cameron, Chandeleurs, La.; Corpus Christi, Alligator Head (dredged), Pass Cabello, Matagorda Bay (immense shells, Mitchell), Galveston, Texas. Dall has named the Texan form var. *texana*. Pleistocene: Labelle and Osprey, West Fla. Pliocene: Shell Creek, Fla.

Genus **GEMMA** Deshayes

gemma Totten, var. *purpurea* H. C. Lea, Am. Jour. Sci., p. 106, pl. 1, f. 1, 1842, (as *Cyrena*); Dall, Tr. W. I. S., 3, pl. 24, f. 2, 4, 4 *b*, 1898; p. 1332, 1903; Vanatta, Proc. A. N. S. Phila., 55, p. 757, '03; Johnson, Occ. Papers, Bost. Soc. N. H., 7, p. 71, 1915.

Parastarte concentrica Dall. Bull. 37, U. S. N. M., p. 48, 1889. *Nomen nudum*.

? *manhattanensis* Prime, Jay's Cat., 4th ed., Suppl., p. 466,

1852 ; Verrill, Inv. An. Vineyard Sound, p. 682, 1873.

Distribution.—Massachusetts to Texas and the Bahamas. Gulf coast.—Recent : St. Joseph's Bay, Calhoun Co., Fla ; Corpus Christi Bay, (dredged, Singley). Pleistocene : Corpus Christi, Tex., Osprey, Manatee Co., Fla.

Genus **PARASTARTE** Conrad

triquetra Conrad, Proc. A. N. S., Phila., 3, p. 24, pl. 1, f. 6, 1845, (as *Astarte*); Proc. A. N. S. Phila., p. 28, '62 ; Dall, Proc. U. S. N. M., 6, p. 339, pl. 10, f. 1-3, '83 ; Bull. 37, U. S. N. M., p. 48, pl. 49, f. 6, 7, 8, '89 ; Tr. W. I. S., 3, p. 1333, 1903 ; Vanatta, Proc. A. N. S. Phila., 55, 757, 1903 ; Vaughan, 2d Ann. Rept. Fla. Surv., p. 149, 1909 ; Publ. 133, Carn. Inst., p. 171, 1910.

Distribution.—Peninsula of Florida. Genotype. Miocene (Jackson's Bluff, Ocklockonnee River) to Recent. Gulf coast.—Recent : St. Joseph's Bay, Crooked Isl., Cedar Keys, Sarasota Bay, Tampa Bay, (Conrad's type locality). Pleistocene : Labelle, Manatee and Osprey. Pliocene : Caloosahatchie and Myakka Rivers.

Genus **PETRICOLA** Lamarck

(**Rupellaria**) **typica** Jonas, Zeitschr. Mal., 1, p. 185 ; Beitr. Moll., p. 1, pl. 7, f. 3, 1844, (as *Choristodon typicum*) ; Dall, Tr. W. I. S., 3, p. 1059, 1900.

lithophaga Arango, 1880. Not of Retzius and Lamarck.

robusta Dall, Bull. 37, U. S. N. M., p. 58, 1889. Not of Sowerby.

Distribution.—Florida to Guadeloupe. Gulf coast.—West Fla. Pliocene : Caloosahatchie marl.

(**Petricolaria**) **pholadiformis** Lamarck, An. s. Vert., p. 505, 1818 ; Conrad, Am. Marine Conch., p. 37, pl. 7, f. 3, '31 ; Say, Am. Conch, pl. 60, f. 1, '34 ; Holmes, Post-Plio. Fos. S. C., p. 38, pl. 7, f. 6, '60 ; Gould, Inv. Mass., Binney's ed., p. 90, fig. 398, '70 ; Dall, Bull. 37, U. S. N. Mus., p. 58, pl. 59, f. 15, '89 ; Singley, 4th Ann. Rept. Tex., p. 328, '92 ; Mitchell, List Texas Shells ; Dall, Tr. W. I. S.,

3, p. 1061, 1900; Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903; Clark, Pleistocene of Maryland, Md. Geol. Surv., p. 201, 1906.

fornicata Say, Jour. Acad. Nat. Sci. Phila., 2, p. 319, 1822.

Distribution.—Prince Edward's Island to Nicaragua, burrowing near low water line. Pleistocene to Recent. Gulf coast.—Ft. Barranca, Indian Pass, Crooked Isl. (Calhoun Co.), Fla.; Cameron, La.; Galveston, Corpus Christi, Matagorda Bay, Tex. Pleistocene: New Orleans pumping station No. 7.

Note.—Type of section *Petricolaria* Stoliczka, characterized by transversely elongated shell and great length of siphons.

Genus **TELLINA** Linnæus

interrupta Wood, General Conchology, 1815; Dall, Bull. 37, U. S. N. M., p. 60, 1889; Proc. U. S. N. M., 23, p. 293, 1901.
maculosa Lamarck, An. s. Vert., 1818.

antoni Philippi, Hanley, Thes. Conch., p. 224, pl. 58, f. 74, 1846; Dall, B. M. C. Z., 9, p. 134, '81; 12, p. 277, 1886.

Distribution.—North Carolina to Brazil. Gulf coast.—West of Florida., 19 fms., dredged S. S. Bache. Var. *mexicana* Petit is more slender than the typical form.

lævigata Linnæus, Syst. Nat., ed. X, 1758; Dall, Proc. U. S. N. M., 6, p. 338, 1883; Bull. 37, U. S. N. M., p. 60, '89; Siugley, 4th Ann. Rept. Texas., p. 329, '93; Dall, Proc. U. S. N. M., 23, p. 293, 1901.

lævis Krebs, West. Ind. Mar. Sh., 1864. Not of Rumphius; nor of Wood which = *fausta* Donovan.

Distribution.—Florida to Guadeloupe. Gulf coast.—Tampa, Sarasota Bay, Fla.; Texas.

lineata Turton, Conch. Dict. British Isls., p. 168, pl. 4, f. 16, 1819; Sowerby, in Conch. Icon., 17, pl. 18, f. 89 a-c; Dall, Bull. 37, U. S. N. M., p. 60, 1889; Proc. U. S. N. M., 23, p. 292, 1901.

brasiliiana Lamarck, 1818, not of Spengler, 1798; *striata* Montagu, 1803, not Chemnitz; *tenuis* Conrad, 1834; *de-*

cussata Adams, 1845.

Distribution.—Florida to Brazil.—Gulf coast.—West Florida.

(*Liotellina*) *radiata* Linnæus, Syst. Nat., ed. X, p. 675, 1758; Sowerby, in Reeve's Conch. Icon., 17, pl. 3, f. 8*b*, 1866; Hanley, in Sowerby's Thesaurus Conch., p. 245; Dall, Bull. 37, U. S. N. M., p. 60, 1889; Singley, 4th Ann. Rept. Tex., p. 329, '93; Dall, Proc. U. S. N. M., 23, p. 293, 1901.

nivea Wood, Gen. Conch., 1815; *unimaculata* Lamarck An. S. Vert., 5, 1818.

Distribution.—Charleston, S. C., to the Antilles. Type of section *Liotellina* Fischer. Gulf coast.—Cedar Keys, Fla., Galveston, Tex.

(*Merisca*) *lintea* Conrad, Jour. A. N. S. Phila., 7, p. 259, pl. 20, f. 3, 1837. Not Conrad 1848 (which is a Vicksburgian, Oligocene species); Dall, Bull. 37, U. S. N. M., p. 60, 1889; Tr. W. I. S., 3, p. 1029, 1900; Proc. U. S. N. M., 23, p. 293, 1901; Vanatta, Proc. A. N. S., Phila., 55, p. 757, 1903.

Distribution.—N. Carolina to Jamaica, 0-30 fms. Miocene to Recent. Gulf coast.—Crooked Isl. (Calhoun Co.), Fla.; Horn Isl., Miss.; Mobile Point, Ala. (type locality).

(*Eurytellina*) *alternata* Say, Jour. A. N. S. Phila., 2, p. 275, 1822; Amer. Conchology, pl. 65, f. 1; Tuomey and Holmes, Pleio. Fos. S. C., p. 89, pl. 22, f. 4, 1857; Holmes, Post-Pl. Fos. S. C., p. 45, pl. 8, f. 1, 1860; Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, 1878; Dall, Bull. 37, U. S. N. M., p. 60, '89; Singley, 4th Ann. Rept. Texas, p. 328, '92; Mitchell, List Tex. Sh., p. 9; Dall, Tr. W. I. S., 3, p. 1029, 1900; Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903.

punicea d'Orbigny, In de la Sagra, Moll. Cubana, 2, 1853, (in part). Not *punicea* Born.

Distribution.—Hatteras to British Honduras, and Antilles to Santo Domingo. Pliocene to Recent. Gulf coast.—Recent: Alligator Harbor (Franklin Co.), Indian Pass (Cal-

houn Co.), Fla. ; Horn Island, Miss. ; Point au Fer, Cameron, La. ; Galveston, Corpus Christi, Matagorda Island, Texas. Pleistocene : Lake Borgne borings, New Orleans artesian well of 1856 at 66 feet ; New Orleans pumping station No. 7 ; Knapp's wells, Terrebonne Parish, No. 1 at 2443 feet, No. 3 at 1150-1200, 1200-1300, 1443-1470 feet. Pliocene : Caloosahatchie.

Note.—Varying in color from an exquisite pink (var. *tayloriana* Sowerby. in Reeve, 1867), to bluish or pure white. Some, like Say's type, are tinged within with canary yellow.

(*Eurytellina*) *georgiana* Dall, Proc. N. S. N. M., 23, pp. 294, 310, pl. 2, f. 3, 1901 ; Dall and Simpson, B. U. S. Fish Com., 1, p. 479, 1901.

nitida var. *carolinensis* Dall, Bull. 37, U. S. N. M., p. 60, 1889. Not *carolinensis* Conrad, 1875.

Distribution.—Hatteras to St. Thomas, West Indies. Dredged in Gulf of Mexico, 32 fms. Slightly resembles the European species *T. nitida* Lamarck.

(*Phyllodina*) *squamifera* Deshayes, Proc. Zool. Soc. London, p. 365, 1854 ; Reeve, Conch. Icon., *Tellina*, pl. 55, f. 325, 1869 ; Dall, Bull. 37, U. S. N. M., p. 60, '89 ; Proc. U. S. N. M., 23, p. 294, 1901.

Distribution.—Hatteras to Sombrero Isl., 22-85 fms. Not in the China Sea, as cited by Sowerby. Gulf coast.—West Florida.

(*Mœrella*) *gouldii* Hanley, Thes. Conch., p. 272, pl. 56, f. 26, 1846 ; Dall, B. M. C. Z., Harv. Coll. 9, p. 134, 1881 ; 12, p. 278, '86 ; Proc. U. S. N. M., 23, p. 294, 1901.

cuneata d'Orbigny, In de la Sagra's Hist. Isla de Cuba, 2, p. 256, pl. 26, f. 23, 1853 ; Dall, Bull. 37, U. S. N. M., p. 60, 1889.

Distribution.—Hatteras to Yucatan, 2-50 fms. Gulf of Mexico ; Tampa, Fla. ; Yucatan Strait, 640 fms.

(*Mœrella*) *martinicensis* d'Orbigny, In de la Sagra's Hist. Pol. y Nat. Isla de Cuba, 2, p. 253, pl. 26, f. 6, 8, 1845 ; Dall,

Proc. U. S. N. M., 23, p. 295, 1901.

tumida and *obtusa* Sowerby, Mon. *Tellina*, in Reeve's Conch. Icon., 17, 1867-1868.

Distribution.—Florida to the Antilles. Gulf coast.—Tampa.

(*Angulus*) *magna* Spengler, Skrifter Natur. Selskabet, 4, 1798; Hanley, Mon. Genus *Tellina* in Sow., Thes., p. 274, No. 96, pl. 65, f. 239, and pl. 63, f. 201; Dall, Bull. 37, U. S. Nat. Mus., p. 60, 1889; Proc. U. S. Nat. Mus. 23, p. 295, 1901; Vanatta, Proc. Acad. Nat. Sci. Phila., 55, p. 757, 1903.

acuta Wood, General Conch., 1815.

elliptica Lamarck, An. s. Vert., 1818.

Distribution.—Hatteras to the Virgin Isl's. Gulf coast.—Crooked Isl., Fla.

(*Angulus*) *tenera* Say, Jour. Acad. Nat. Sci. Phila., 2, p. 303, 1822; Hilgard, Rept. Chief Eng. to Sec. of War, p. 358 '70; House of Rep. Ex. Doc., 1, pt. 2, p. 887, '78; Dall, Bull. 37, U. S. N. M., p. 60, pl. 55, f. 1, pl. 56, f. 13, '89; Proc. U. S. N. M., 23, p. 295, 1901; Vanatta, Proc. Acad. Nat. Sci. Phila., 55, p. 757, 1903. Not the figure of *tenera* Sowerby, in Conch. Icon., pl. 34, f. 195, 1867.

? *elucens* Mighels, Proc. Bost. Soc. Nat. Hist., 1, 1844.

agilis Stimpson, Shells of New Eng., 1857; Dall, Proc. U. S. N. M., 6, p. 338, 1883.

omoia Ravenel, 1875.

Distribution.—Prince Edward's Id. to Barbados, 0-80 fms. Pliocene to Recent. Gulf coast.—Indian Pass (Calhoun Co.), Cedar Keys, (variety); dredged west of Florida in 30 fms. Pleistocene: Lake Borgne borings; New Orleans well of 1856, at 235 and 570 feet; Knapp's No. 3 well, Terrebonne Parish, surface to 700 feet, 570-700, 790-830, 1400-1440, 1443-1470 feet. Closely allied to *polita* and *iris*.

Note.—*Tellina tenella* Verrill (Rept. Inv. An. Vineyard Sound, U. S. Fish Com., 1872) was listed by Dr. Dall from Tampa (Bull. 37, U. S. N. M., p. 60, 1889), but on further examination he decided the Tampa shell was not this

species (which ranges from Mass. to New York). *Modesta*, Verrill, 1872, not of Carpenter, 1864, is *fide* Dall, a synonym of *tenella* Verrill. Name *tenella* is preoccupied.

(*Angulus*) *texana* Dall, Proc. U. S. N. Mus., 23, pp. 295, 313, 1901.

Distribution.—Charlotte Harbor, West Fla., Corpus Christi Bay, Tex., 3-4 feet of water. Nearest ally is the northern form, *tenella* Verrill.

(*Angulus*) *versicolor* Cozzens, In DeKay, Nat. Hist. New York, 5, p. 209, pl. 26, f. 172, 1843; Dall, Bull. 37, U. S. N. M., p. 60, '89; Singley, 4th Ann. Rept. Tex., p. 329, '92; Dall, Proc. U. S. N. M., 23, p. 295, 1901.

Distribution.—Connecticut to Brazil, 15-50 fms. Gulf coast. West Fla., Corpus Christi, Tex. Pleistocene: Osprey, Florida.

(*Angulus*) *consobrina* d'Orbigny, In de la Sagra's Hist. Isla. de Cuba, 2, p. 254, pl. 26, f. 911, 1845; Dall and Simpson, Bull. U. S. Fish Com., 1, p. 480, 1901; Vanatta, Proc. A. N. S., Phila., 55, p. 757, 1903.

Distribution.—Antilles and Gulf of Mexico at Crooked Isl., Fla., and Horn Isl., Miss. (Vanatta). Closely related to and perhaps a variety of *versicolor* Cozzens.

(*Angulus*) *sybaritica* Dall, Bull. Comp. Zool. Harv. Coll., 9, p. 134, 1881; 12, p. 277, pl. 6, f. 11, '86; Bull. 37, U. S. N. M., p. 60, pl. 6, f. 11, '89; Proc. U. S. N. M., 26, p. 295, 1901.

Distribution.—Hatteras to Brazil, 20-640 fms. Gulf of Mexico, Yucatan Strait. Its bright rose pink is very unusual in a deep water shell. Pleistocene: Osprey, West Fla.

(*Angulus*) *sayi* Deshayes, Manuscript; Dall, Tr. W. I. S., 3, p. 1034, 1900.

polita Say, Jour. A. N. S. Phila., 2, p. 275, 1822; Am Conch., pl. 65, f. 2, '34; Holmes, Post-Pl. Fos. S. C., p. 45, pl. 8, f. 2, '58; Hilgard, House of Rep. Ex. Doc. 2, p. 887, '78; Dall, Bull. 37, U. S. N. M., p. 60, '89; Singley, 4th Ann. Rept. Texas, p. 328, '92; Dall, Proc. U. S. Nat. Mus., 23, p. 296, 1901; Vanatta, Proc. A. N. S.,

55, p. 757, 1903. Not *polita* of Spengler, 1798; nor of Sowerby, 1825; nor of Poli and Risso.

Note.—Inasmuch as the name *polita* had already been given several times to species of *Tellina* before Say named his shell, Dr. Dall proposed the name *sayi*, which was suggested in a manuscript of Deshayes in Dr. Dall's possession.

Distribution.—North Carolina to Progreso, peninsula of Yucatan. Pliocene to Recent. Gulf coast.—St. Joseph's Bay, Fla.; Corpus Christi, Tex. Pleistocene: Lake Borgne borings and the New Orleans artesian well of 1856 (Hilgard). Pliocene: Caloosahatchie.

(*Angulus*) *pauperata* d'Orbigny, In de la Sagra's Hist. Pol. y Nat. Isla de Cuba, 2, 1846; Dall, Proc. U. S. N. M., 23, p. 296, 1901; Vanatta, A. N. S. Phila., 55, p. 757, 1903.

Distribution.—Florida to Martinique. Gulf coast.—Tampa and St. Joseph's Bay and Crooked Isl., Calhoun Co., Fla.

(*Angulus*) *tampaensis* Conrad, Jour. Acad. Nat. Sci. Phila., 2, p. 281, pl. 15, f. 8, 1866; Dall, Bull. 37, U. S. N. M., p. 60, '89, (as *Macoma*); Singley, 4th Ann. Rept. Tex., p. 329, '93; Mitchell, List Tex. Sh., p. 17; Dall, Proc. U. S. N. M., 23, p. 296, 1910.

Distribution.—West Florida to Texas, Pliocene to Recent. Localities: Tampa Bay (type locality), Fla.; Corpus Christi Bay, (dredged), Espiritu Santo Bay, living on the flats. Pliocene: Caloosahatchie.

(*Angulus*) *mera* Say, Amer. Conchology, 1834; Dall, Bull. 37, U. S. N. M., p. 60, 1889; Proc. U. S. N. M., 23, p. 296, 1901.

Distribution.—South Carolina to the Bahamas. Pliocene to Recent. Gulf coast—Tampa, Florida. Pliocene: Caloosahatchie beds.

(*Angulus*) *promera* Dall, Proc. U. S. N. M., 23, pp. 296, 312, pl. 2, f. 11, 1901.

Distribution.—West Fla., at Tampa Bay to Curaçao Isl.

(*Angulus*) *simplex* d'Orbigny, In de la Sagra's Hist. Pol. y Nat.

Isla de Cuba, 2, 1846; Dall, Proc. U. S. N. M., 23, p. 296, 1901.

Distribution.—Gulf of Mexico to the Antilles. Dredged at 60 fms. between Cedar Keys and the Mississippi delta.

(*Scissula*) *similis* Sowerby, British Miscellany, 1806; Dall, Proc. U. S. N. M., 23, p. 296, 1901.

decora Say, Jour. A. N. S. Phila., 5, 1827; Hanley, Thesaurus, pl. 56, f. 27 (only), 1846; Dall, Bull. 37, U. S. N. M., p. 60, 1889.

Distribution.—Florida to Venezuela. Gulf coast.—West Fla.

(*Scissula*) *iris* Say, Proc. A. N. S. Phila., 2, p. 302, 1822; Dall, Bull. 37, U. S. N. M., p. 60, 1889; Proc. U. S. N. M., 23, p. 297, 1901.

caribæa d'Orbigny, In de la Sagra's Hist. Isla de Cuba, 2, 1846.

Distribution.—North Carolina to Guadeloupe Isl. Gulf coast. St. Mark's, Cedar Keys, Ft. Barranca, Fla.; Cameron, La. Pleistocene: New Orleans pumping station No. 7, (last identification doubtful).

Note.—As its name implies, this lovely shell is remarkable for the play of rainbow colors on the valves.

Genus **STRIGILLA** Turton

carnaria Linnæus, Syst. Nat., ed. X, p. 676, 1758; Dithyra Britanica, p. 117, pl. 7, f. 15, 1822; Dall, Proc. U. S. N. M., 23, p. 297, 1901; Dall and Simpson, Bull. U. S. Fish Com., 1, p. 482, pl. 58, f. 3, 1901; Dall, in Matson, U. S. G. S., Prof. Paper 98-L, p. 177, 1916.

carneosum Da Costa, 1778, (as *Cardium*).

areolata Menke, Zeitschr, Mal., 1847.

Distribution.—North Carolina to Brazil. Apparently not reported from the Recent Gulf fauna, but cited by Dr. Dall from the Gulf Pleistocene in a well at Ft. Morgan, Ala., at 100-112 and 169-175 feet.

flexuosa Say, Jour. A. N. S. Phila., 2, p. 303, 1822, (as *Tellina*; Holmes, Post-Pl. Fos. S. C., p. 44, pl. 7, f. 14, 1860; Hilgard, Rept. Chief of Engineers to Sec. of War,

p. 358, '70 ; House of Rep. Ex. Doc. 1, pt. 2, pp. 887-889, '78 ; Dall, Bull. 37, U. S. N. M., p. 62, '89 ; Tr. W. I. S., 3, p. 1039, 1900 ; Proc. U. S. N. M., 23, p. 297, '01 ; Vanatta, Proc. A. N. S. Phila., 55, p. 757, '03.

mirabilis Philippi, Arch. f. Natur., 1, p. 260, 1841, (as *Tellina*).

carolinensis Conrad, Proc. A. N. S., Phila., for 1862, p. 573.

Distribution.—Hatteras to Guadeloupe. Miocene to Recent.

Gulf coast.—Recent : Ft. Barranca, Fla. ; Horn Island, Miss. : Galveston, Texas. Pleistocene : New Orleans well of 1856, New Orleans pumping station No. 7, New Orleans Gymnasium well at 1200 feet ; Saratoga, Texas, Teel well No. 1 at 940 feet.

galvestonensis Harris, Bull. Am. Pal., 1, No. 3, p. 92, pl. 1, f. 4, 1895.

Distribution.—Upper Miocene, Galveston artesian well at 2552-2733 feet (Harris).

Genus **TELLIDORA** Morch

cristata Récluz, Révue Cuvier, p. 270, 1842 ; Dall, Bull. 37, U. S. N. M., p. 62, '89 ; Tr. W. I. S., 3, p. 1037, 1900 ; Proc. U. S. N., 23, 298, 1901 ; Mitchell, List Tex. Sh. ; Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903 ; Vaughan, Publ. 133, Carn. Inst., p. 171, 1910.

lunulata Holmes MS. ; Adams, Genera Rec. Moll., 1, p. 401, 1856 ; Holmes, Post-Pl. Fos. S. C., p. 47, pl. 9, f. 7 a-b, 1858 ; Hilgard, House of Rep., Ex. Doc. 1, pt. 2, pp. 887, 1878.

Distribution.—North Carolina to Campeche. Pliocene to Recent. Gulf coast.—Crooked Isl., West Fla. ; Texas. Pleistocene : Lake Borgne borings, New Orleans well of 1856 ; Labelle, Fla. Pliocene : Caloosahatchie and Shell Creek, Fla.

Genus **METIS** H. and A. Adams

interstriata Say, Jour. A. N. S. Phila., 5, p. 218, 1827, (*intastriata* by typographical error. *Tellina*) ; DeKay, Zool. N.

Y., p. 211, 1843; Dall, Bull. 37, U. S. N. M., p. 62, '89; Tr. W. I. S., 3, p. 1043, 1900; Proc. U. S. N. M., 23, p. 298, '01; Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903.

grüneri Philippi, Zeitschr. f. Mal., 2, p. 150, 1845.

ephippium Gregory, Quart. Jour. Geol. Soc. London, p. 293, 1895; not of Spengler, 1793.

sagræ d'Orbigny, Pal. Cub., pl. 4, f. 8, 9, (1853?). Internal cast, probably this species.

Distribution.—Florida to Guadeloupe, 30 or less fms. Pleistocene to Recent. Gulf coast.—St. Joseph's Bay, West Fla.; Texas.

Genus **MACOMA** Leach

constricta Bruguière Mém. Soc. Hist. Nat. 1, p. 126, No. 3, 1799, (as *Solen*); Philippi, Abb. und. Besch., 1, p. 9; pl. 1, f. 5, 1843; Dall, Bull. 37, U. S. N. M., p. 60, '89; Siugley, 4th Ann. Rept. Texas., p. 329, '93; Dall, Tr. W. I. S., 3, p. 1050, 1900; Proc. U. S. N. M., 23, p. 298, '01. Mitchell, List Tex. Sh.; Vanatta, Proc. A. N. S. Phila., 55, 757, 1903.

cayennensis Lamarck, An. s. Vert., 5, p. 514, 1818, (as *Psammobia*); Deshayes, An. s. Vert., ed. 2, 6, p. 177, 1835; Hanley, Thes. Conch., p. 312, pl. 62, f. 190, 1846; Holmes, Post-Plio. Fos. S. C., p. 47, pl. 8, f. 4, 1859.

lateralis Say, Jour. A. N. S. Phila., 5, p. 218, 1827; *inornata* Adams.

Distribution.—New Jersey to Brazil. Pliocene to Recent. Gulf coast.—Recent: St. Mark's, Cedar Keys, Indian Pass, Fla.; Point au Fer, Cameron, La.; Galveston, Sabine Pass, Matagorda, Carancahua, Lavaca, and Turtle bays, Tex. Pleistocene: Grand Chênier, New Orleans pumping station No. 7. Pliocene: Caloosahatchie.

cerina C. B. Adams, Proc. Bost. Soc. Nat. Hist., 2, 1845; Dall, Bull. 37, U. S. N. M., p. 60, '89; Proc. U. S. N. M., 23, p. 299, 1901.

Distribution.—Florida to Jamaica. Gulf coast.—Shark River, Monroe Co., southwestern Fla.

leptonoidea Dall, Nautilus, 9, p. 33, 1895; Proc. U. S. N. M., 23, pp. 299, 323, pl. 4, f. 4, 9, 1901; Checklist Rec. West Coast Moll., p. 36, 1916.

Distribution.—Matagorda Bay, Texas (type locality), in shallow, warm water; Santa Barbara channel, California, dredged at 332 and 314 fms., temperature 44° F. Showing an unusual adaptability to warm and cold temperatures.

mittelli Dall, Nautilus, 9, p. 33, 1895; Proc. U. S. N. M., 23, pp. 299, 314, pl. 2, f. 4, 5, 1901; Bull. 37, U. S. N. M., reprint suppl. pls., pl. 92, f. 4; Mitchell, List Tex. Sh., page 4.

Note.—Mr. J. D. Mitchell discovered this species in Carancahua Bay, in muddy sediments just beneath the surface.

Distribution—Charleston, S. C., and Matagorda and Carancahua Bays, Texas.

phenax Dall, Proc. U. S. N. M., 23, pp. 299, 314, 1901.

Distribution.—Chesapeake Bay; Tampa Bay.

tenta Say, Am. Conch., pl. 65, f. 3, 1834, (as *Tellina*); Holmes, Post-Pl. Fos. S. C., p. 46, pl. 8, f. 3, '60; Gould, Inv. Mass., Binney's ed., p. 96, f. 402, '70; Hilgard, Rept. of Engineers to Sec. of War, p. 358, 1870; House of Rep. Ex. Doc., 1, pt. 2, p. 887, '78; Dall, Bull. 37, U. S. N. M., p. 60, pl. 56, f. 10, '89; Tr. W. I. S., 3, p. 1049, 1900; Proc. U. S. N. M., 23, p. 299, '01; Vanatta, Proc. Acad. Nat. Sci. Phila., 55, p. 757, 1903.

souleyetiana Récluz, Jour. de Conch. 3, p. 253, pl. 10, f. 5, 1852. Not *souleyeti* Hanley, Proc. Z. S., p. 71, 1844.

récluziana Tryon, Cat. Tell., p. 98, '69.

Distribution.—Cape Cod to Rio la Plata. Pliocene to Recent. Gulf coast.—Crooked Isl., Fla. (?); Point au Fer, La. Pleistocene: Lake Borgne borings; New Orleans well of 1856, at 41 feet; (?) New Orleans Gymnasium club well at 1200 feet. Pliocene: Caloosahatchie.

Note.—Variety *souleyetiana* Récluz is the more southern form, tinted delicately with orange.

(*Psammacoma*) *tageliformis* Dall, Tr. Wagner Inst. Sci., 3, p. 1055, 1900; Proc. U. S. N. M., 23, pp. 300, 315, '01; Dall and Simpson, Bull. U. S. Fish Com., 1, p. 482, pl. 55, f. 10, 11, 15, 1901.

Distribution.—Texas and Porto Rico, W. I. Recent: Galveston and Corpus Christi. Pleistocene: Corpus Christi.

(*Cydippina*) *brevifrons* Say, Am. Conch., pl. 64, f. 1, 1834, (as *Tellina*); Binney's Say, p. 227, 1858; Dall, Bull. 37, U. S. N. M., p. 60, '89; Singley, 4th Ann. Rept. Texas, p. 329, '92; Dall, Tr. W. I. S., 3, p. 1055, 1900; Proc. U. S. N. M., 23, p. 300, '01; Dall and Simpson, Bull. U. S. Fish Com., 1, p. 481, pl. 55, f. 3, 12, 13, '01; Vanatta, Proc. Acad. Nat. Sci. Phila., 55, p. 757, 1903.

Distribution.—New Jersey to Rio de Janeiro. Pliocene to Recent. Gulf coast.—Horn Island, Miss.; Galveston, Tex. Pliocene Caloosahatchie marl, Monroe Co., Fla.

(*Cydippina*) *limula* Dall, Bull. 37, U. S. N. M., p. 60, 1889 (*non nudum*); Nautilus 9, p. 32, 1895; Proc. U. S. N. M., 23, pp. 300, 315, pl. 2, f. 1, 1901.

Distribution.—North Carolina to Barbados, 22-100 fms. West Florida (Dall).

(*Cydippina*) *extenuata* Dall, Proc. U. S. N. M., pp. 300, 314, pl. 2, f. 7, 1901.

Distribution.—Dredged at 32 fms., U. S. Fish Com., between the Mississippi delta and Cedar Keys, Fla.

Genus **SEMELE** Schumacher

proficua Pulteney, In Hutchin's Dorset., p. 29, pl. 5, f. 4, 1799, (as *Tellina*); Dall, Tr. W. I. S., 3, p. 991, 1900; Dall and Simpson, Bull. U. S. Fish Com., 1, p. 477, 1901.

decussata Wood, Gen. Conch., p. 190, pl. 43, f. 2, 3, 1815. Reeve, Conch. Icon., *Amphidesma*, pl. 4, f. 23, 1853.

orbiculata Say, Jour. A. N. S. Phila., 2, p. 307, 1822; Tuomey and Holmes, Pleio. Fos. S. C., p. 94, pl. 23, f. 4, 1856, (as *Amphidesma*); Holmes, Post-Pl. Fos. S. C., p. 51, pl. 9, f. 8, 1858.

radiata Say, Jour. A. N. S. Phila., 5, p. 230, 1826. Not of Reeve, 1853.

jayanum Adams, Proc. Bost. S. N. H., 2, p. 10, 1845.

reticulata (Chemnitz) d'Orbigny, Moll. Cuba, p. 240, 1846; Reeve, Conch. Icon., *Amphidesma*, pl. 5, f. 29, 1853; Dall, Bull. 37, U. S. N. M. p. 62, '89; Singley, 4th Ann. Rept. Texas, p. 329, '92; Mitchell, List Tex. Sh. Not *reticulata* Linnæus, Syst. Nat., ed. XII, p. 1119, 1767, which Linnæus said was brought by Tesdorf from India.

subtruncata (Sowerby) Reeve, Conch. Icon., *Amphidesma*, f. 11, 1853.

carolinensis Conrad, Am. Jour. Conch., 3, p. 14, 1867.

Distribution.—Virginia to Brazil. Pliocene to Recent. Gulf coast.—West Florida and Galveston, Tex.

purpurascens Gmelin, Syst. Nat., 6, p. 3288, 1792, (as *Venus*); Morch, 1853, Krebs, 1864, Arango, 1878; Dall, Tr. W. I. 3, p. 993, 1900; Dall and Simpson, Bull. U. S. Fish Com., 1, p. 477, 1901. Not of Sowerby, Reeve or Lamarck.

obliqua Wood, General Conch., p. 152, pl. 41, f. 4 and 5, 1815, (as *Tellina*); Reeve, Conch. Icon, *Amphidesma*, pl. 1, f. 5a, b, '53; Dall, Bull. 37, U. S. N. M., p. 62, '89, Singley, 4th Ann. Rept. Texas, p. 329, '92; Mitchell, List Tex. Sh., p. 16.

variegata Lamarck, An. s. Vert., 5, p. 490, 1818; d'Orbigny, Moll. Cuba, 2, p. 239, 1853.

ornata Gould, 1862; Tryon, 1874.

Distribution.—North Carolina to Rio de Janeiro. Pliocene to Recent. Gulf coast.—West Florida, Galveston and Matagorda peninsula, Tex. Pliocene: Caloosahatchie.

bellastriata Conrad, Jour. Acad. Nat. Sci. Phila., 7, p. 239, pl. 20, f. 4, 1837, (as *Amphidesma*); Dall, Tr. W. I. S., 3, p. 993, 1900; Dall and Simpson, Bull. U. S. Fish Com., 1, p. 477, 1901; Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903.

cancellata d'Orbigny, In Sagra's Hist. Cuba, 2, p. 241, pl. 25, f. 42-44, 1853; Dall, Bull. 37, U. S. N. M., p. 62, '89.

nexilis Gould, Otia Conch., p. 238, 1862; Dall, Proc. U. S. N. M., 6, p. 338, 1883.

lata (Adams) Bush, Trans. Conn. Acad., 6, pt. 2, p. 476, 1885. *Lapsus pennæ*. There is no *S. lata* Adams.

Distribution.—Hatteras to Brazil, moderate depths. Pliocene to Recent. Gulf coast.—Recent: Cedar Keys (*nexilis* Dall, '83), St. Joseph's Bay, West Fla., also 30 fms. off shore; Horn Island, Miss.; Mobile Point, Ala. (type locality). Pleistocene: New Orleans pumping station No. 7. Pliocene: Caloosahatchie, Fla.

(*Semelina*) *nuculoides* Conrad, Am. Jour. Sci., 41, p. 347, 1841; Fos. Med. Tert., p. 73, pl. 41, f. 6, 1845, (as *Amphidesma*); Pr. A. N. S., Phila., p. 574, 1863, (as *Abra*); Dall, Bull. 37, U. S. N. M., p. 60, '89; Tr. W. I. S., 3, p. 994, 1900; Dall and Simpson, Bull. U. S. Fish Com., 1, p. 477, 1901. Not *Syndosmya nuculoides* Whitfield, Mio. N. J., 1894, = *Sportella* sp. (Dall).

Distribution.—Hatteras to the Antilles, 2-124 fms. Miocene (Oak Grove, Fla.; var. *striatula* Dall; N. C. and Va.) to Recent. Gulf coast.—Recent: Tampa and Pensacola, Fla. Pleistocene: Gymnasium club well at 1200 feet, New Orleans. Pliocene: Caloosahatchie beds, Fla.

Note.—Comparison of specimens from the Gymnasium well shows close agreement with specimens of *nuculoides* from the Miocene of Curry, N. Car. Shell having the anterior end long, posterior short, sinus enormous.

Genus CUMINGIA Sowerby

tellinoides Conrad, Jour. Acad. Nat. Sci. Phila., 6, p. 258, pl. 11, f. 2, 3, 1831; Amer. Marine Conch., pl. 14, f. 2, 1831, (as *Mactra*); Holmes, Post-Pl. Fos. S. C., p. 53, pl. 8, f. 12 '60; Gould, Inv. Mass., Binney's ed., p. 79, f. 390, '70; Dall, Bull. 37, U. S. N. M., p. 62, pl. 56, f. 14, '89; Singley, 4th Ann. Rept. Texas, p. 329, 1892; Mitchell, List Tex. Sh.; Dall, Tr. Wagner Inst. Sci., 3, p. 1000, 1900; Clark, Md. Geol. Surv., Pleistocene, p.

197, pl. 56, f. 1-5, 1906; Johnson Occ. Papers, Bost. Soc. N. H., 7, p. 74, 1915.

borealis Conrad, Am. Jour. Conch. 2, p. 76, 1866.

Lavignon petitiana and *antillarum* d'Orbigny, Moll. Cuba, 2, 1846.

Distribution.—Prince Edward's Island to Florida. Pleistocene to Recent. Gulf coast.—Ft. Barranca, Fla.; Shamrock Cove in Corpus Christi Bay, Texas. Pleistocene: Grand Chénier, La.

Note.—Conrad's *tellinoides* from the Miocene (Fos. Med. Tert. p. 28, pl. 15, f. 4, '38) is not identical with the recent shell, and is placed by Dall in synonymy with *C. medialis* Conrad.

Genus ABRA Leach

æqualis Say, Jour. Acad. Nat. Sci. Phila., 2, p. 307, 1822 (as *Amphidesma*); Conrad, Fos. Med. Tert., p. 76, pl. 43, f. 9, 1845; Tuomey and Holmes, Pleio. Fos. S. C., p. 93, pl. 23, f. 3, '56; Holmes, Post-Pl. Fos. S. C., p. 50, pl. 8, f. 7, '60; Conrad, Proc. A. N. S. Phila., p. 574, '63; Harris, Bull. Am. Pal. 1, No. 3, p. 92, '95; Dall, Proc. U. S. N. M., 6, p. 338, '83; Singley, 4th Ann. Rept. Tex. p. 329, '92; Dall, Bull. 37, U. S. N. M., p. 62, '89; Tr. W. I. S., 3, p. 998, 1900; Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903; Johnson, Occ. Papers, 7, Bost. Soc., N. H., p. 75, 1915. Not of Whitfield, 1894 (= *Semele* sp., Dall).

nuculiformis Conrad, Am. Jour. Conch., 3, p. 14, 1867.

Distribution.—Hatteras to Gulf of Mexico, moderate depths. Miocene (N. and S. Car.) to Recent. Gulf coast.—Recent: Cedar Keys, Ft. Barranca, Indian Pass, St. Joseph's Bay, Crooked Island, Fla.; Horn Island, Miss.; Point au Fer, La.; Galveston, Tex. Pleistocene: Galveston artesian well, surface to 900 feet (Harris); New Orleans Gymnasium well at 1200 feet; New Orleans pumping station No. 7; Grand Chénier; Knapp's No. 2 well, Terrebonne Parish, at 1050-1190, 1519-1542 feet.

hoica Dall, Bull. Mus. Comp. Zool. Harv. Coll., 9, p. 133,

1881, (as *Syndosmya*); 12, p. 278, pl. 4, f. 8, '86; Bull. 37, U. S. N. M., p. 62, pl. 4, f. 8, '89; Tr. W. I. S. 3, p. 998, 1900; Dall and Simpson, Bull. U. S. Fish Com., 1, p. 478, 1901.

Distribution.—Rhode Island to Martinique, 14-860 fms. Pleistocene to Recent. Gulf coast.—Ft. Barranca, Fla.; Cameron, La.; Galveston, Tex. Pleistocene: Grand Chênier, La.

longicallus Scacchi, Notiz., p. 16, pl. 1, f. 7, 1836, (as *Tellina*); Philippi, En. Moll. Sic., 2, p. 8, pl. 13, f. 7, 1844, (as *Syndosmya*); Dall, B. M. C. Z., 9, p. 133, '81; 12, p. 278, '86; Bull. 37, U. S. N. M., p. 62, '89.

Distribution.—Arctic Ocean to Grenada Isl., W. I., 50-1467 fms. Also European. Pliocene to Recent. Gulf of Mexico, dredged, Lat. 23° N., Long. 83° W. at 860 fms. Temperature 42° F.

Genus **PSAMMOBIA** Lamarck

(**Gobbræus**) **vaginata** Reeve, Dall, Bull. 37, U. S. N. M., p. 58, 1889; Proc. A. N. S. Phila., 50, p. 57, '98; Tr. W. I. S., 3, p. 976, 1900.

Distribution.—Charlotte Harbor, Florida. (Doubtful).

Note.—This genus has now nearly vanished from Antillean and Gulf waters where all species are extremely rare.

Genus **SANGUINOLARIA** Lamarck

sanguinolenta Gmelin, (as *Solen*); Fischer, Man. de Conch., p. 1105, 1887; Dall, Tr. W. I. S. 3, p. 972, 1900.

rosea Lamarck; Dall, Bull. 37, U. S. N. M. p. 60, 1889; Singley, 4th Ann. Rept. Tex., p. 328, '92; Mitchell, List Tex. Sh., p. 13; Dall, Proc. A. N. S. Phila., 50, p. 58, 1898.

Distribution.—Gulf of Mexico to Trinidad. Also Ceylon (Dall). Gulf coast.—West Florida; Pass Cabello and Galveston, Tex.

(**Psammotella**) **operculata** Gmelin; Dall, Proc. A. N. S. Phila., 50, pp. 58, 62, 1898.

Tellina rufescens Chemnitz.*Soletellina rufescens* Dall, Bull. 37, U. S. N. M., p. 58, 1889.

Distribution.—Gulf of Mexico to Brazil. Gulf coast.—Tex. (*Psammotella*) *vitrea* Deshayes; Dall, Proc. A. N. S. Phila., 50, p. 58, 1898.

Distribution.—Texas to Colon.

Genus **HETERODONAX** Morch

himaculata Linnæus, Syst. Nat., ed. X, p. 677, 1758, (as *Tellina*); Sowerby, Conch. Icon., 17, pl. 18, f. 94 *a-c*, 1866; Dall, Bull. 37, U. S. N. M., p. 58, '89; Proc. A. N. S. Phila., 50, p. 59, '98; Dall and Simpson, Bull. U. S. Fish Com., 1, p. 475, 1901; Dall, Checklist West Coast Sh., p. 38, 1916.

Tellina vicina C. B. Adams.

Distribution.—Florida to Brazil. Also Monterey, California, to Panama. Recent. Gulf coast.—West Fla.

alexandra Dall, Proc. U. S. N. M., 46, p. 228, pl. 20, f. 8, 1914.

Distribution.—Pliocene, Satilla formation. Well near Alexandra, La., at 49 feet.

Genus **ASAPHIS** Modeer

coccinea Martyn, Univ. Conch., No. 135, pl. 135, 1784, (as *Cardium*); Ed. Chenu, pl. 41, f. 2; Morch, Jour. de Conch., 7, p. 140, 1858; Dall, Proc. A. N. S. Phila., 50, p. 59, 1898; Dall and Simpson, Bull. U. S. Fish Com., p. 476, 1901.

deflorata (Linn.) d'Orbigny, (as *Capsa*); Dall, Bull. 37, U. S. N. M., p. 60, 1889.

Distribution.—Charlotte Harbor, West Florida, to Brazil.

Genus **TAGELUS** Gray

gibbus Spengler, Skrift Nat. Selsk., 3, p. 304, 1794, (as *Solen*); Dall, Proc. U. S. N. M., 6, p. 337, 1883; Bull. 37, U. S. N. M., p. 58, pl. 55, f. 3, pl. 56, f. 3, '89; Singley, 4th Ann. Rept. Texas, p. 328, '92; Mitchell, List Tex. Sh., p. 3; Dall, Tr. W. I.S., 3, p. 983, 1900; Clark, Pleisto-

cene of Maryland, p. 200, pl. 57, 1906.

guineensis, Chemn., 1795; *adansonii* Bosc., 1802; *declivis*, Turton, 1819; *notata* Schumacher, 1817.

caribæus Lamarck, 1818; Conrad, Am. Marine Conch., p. 22, pl. 4, f. 3, 1831; DeKay, Nat. Hist. New York, 5, p. 243, f. 302; Sowerby, Conch. Icon., *Solecurtus*, f. 21 *a-b*, '74; Holmes, Post-Pl. Fos. S. C., p. 54, pl. 8, f. 14, '60. Not of Conrad, Med. Tert., 1845.

centralis Sowerby, 1874, not of Say.

Distribution.—Cape Cod, Mass., to Brazil also northwest coast of Africa. Miocene of Va. to Recent. Gulf coast.—Recent: Ft. Barranca, St. Mark's, Fla.; Chandeleurs, La.; Port Lavaca, Fort Isabel, Galveston and Matagorda, Corpus Christi, Carancahua, Keller's and Espiritu Santo Bays, Texas. Pleistocene: New Orleans. Pliocene: Caloosahatchie beds, Fla.

(*Mesopleura*) *divisus* Spengler, Skrift. Nat. Selsk. 3, p. 96, 1794, (as *Solen*); Gould, Inv. Mass., Binney's ed., p. 44, f. 368, 1870; Dall, Bull. 37, U. S. U. S. N., p. 58, pl. 56, f. 5, '89; Tr. W. I. S., 3, p. 984, 1900; Mitchell, List Tex. Sh.; Vanatta, Proc. A. N. S. Phila., 55, 757, 1903; Vaughan, 2d Ann. Rept. Fla., p. 148, 1909.

bidens Chemnitz, 1795; *bidentatus* Spengler, 1794; *fragilis* Pulteney; *centralis* Say, 1822, not of Sowerby, 1874; *floridana* Conrad, 1848; *carpenteri* Dunker, 1861; *equalis* Conrad 1863.

Distribution.—Massachusetts to the Antilles. Pliocene to Recent. Gulf coast.—Indian Pass and Crooked Island, Calhoun Co., Fla.; Texas. Pleistocene: Osprey and Orient, West Fla.; New Orleans pumping station No. 7. Pliocene: Caloosahatchie marls.

Genus **PSAMMOSOLEN** Risso

(Azor) *cumingianus* Dunker, Proc. Zool. Soc., p. 425, 1861, (as *Macha*); Dall, Proc. U. S. N. M., 22, p. 108, 1989; Tr. W. I. S., 3, p. 961, 1900.

lineatus Gabb, Jour. A. N. S. Phila., 2d ser., 8, p. 370, pl. 47, f. 71, 1881, (as *Tagelus*).

multilineata Dall, Tr. W. I. S., 3, p. 938, pl. 28, f. 15, 1898, (as *Macha*).

Distribution.—North Carolina to Brazil. Gulf coast.—Recent: West Fla. and Texas. Pliocene: Caloosahatchie, Fla.

Genus **DONAX** Linnæus

denticulata Linnæus, Syst. Nat., ed. X, p. 683, 1758; Reeve, Conch. Icon., 8, pl. 7, f. 48 *a, b*, 1854; Dall, Bull. 37, U. S. N. M., p. 58, 1889; Dall and Simpson, Bull. U. S. Fish Com., 1, p. 476, 1901.

Distribution.—Texas, West Florida and the Antilles to Rio de Janeiro.

fossor Say, Jour. A. N. S., Phila., 2, p. 306, 1822; Tryon, Am. Mar. Conch., p. 153, pl. 27, f. 376, 377, 1873; Dall, Bull. 37, U. S. N. M., p. 58, '89; Tr. W. I. S., 3, p. 967, 1900.

variabilis Tuomey and Holmes, Pleio. Fos. S. C., p. 95, pl. 23, f. 6, 1857. Not of Say.

angustatus Sowerby, 1866; *protractus* Conrad 1849; *parvula* Philippi, 1845.

Distribution.—New Jersey to Florida Keys. Miocene (of N. Car.) to Recent. Gulf coast.—West Florida and Texas (Dall, '89). Pliocene: Caloosahatchie beds.

tumida Philippi, Zeitschr. Mal., p. 147, 1848; Römer's Texas, p. 453, 1849; Singley, 4th Ann. Rept. Tex., p. 328, 1892; Harris, Bull. Am. Pal., 1, No. 3, p. 92, '95; Dall, List of Cameron Sh., (MS.); Mitchell, List Tex. Sh.; Dall, Nautilus 5, p. 126, 1892.

Distribution.—St. Augustine to Texas and Vera Cruz, Mexico. Pleistocene to Recent. Gulf coast.—Recent: Cameron, Chandeleurs, Southwest Pass, Point au Fer, La.; Galveston (type locality), Corpus Christi, Tex. Pleistocene: Galveston well, surface to 458 feet (Harris); Teel No. 1 well, Saratoga, Texas, at 940 feet; Grand Chénier, La.; New Orleans Gymnasium well at 1200 feet.

texasiana Philippi, Zeitschr. für Malakozoologie, 4, p. 77, 1847; Römer's Texas, p. 452, 1849; Dall, Nautilus 5, p. 126, '92.

Distribution.—Galveston, Texas, to Vera Cruz, Mexico.

rœmeri Philippi, Rœmer's Texas, p. 452, 1849; Singley, 4th Ann. Rept. Texas, p. 328, 1892; Dall, Nautilus 5, p. 125, 1892; Mitchell, List Tex. Sh., p. 13; Dall, Tr. W. I. S., 3, p. 969, 1900.

Distribution.—Texas to Vera Cruz, Mexico. Gulf coast.—Galveston (type locality), Corpus Christi and Matagorda Island, Tex.

variabilis Say, Jour. A. N. S. Phila., 2, p. 305, 1822; Coues, Proc. A. N. S., Phila., p. 137, '71; Tryon, Am. Mar. Conch., p. 154, pl. 27, f. 378-379, '73; Hilgard, Rept. of Chief of Engineers to Sec. of War, p. 358, '70; House of Rep. Ex. Doc. 1, pt. 2, pp. 887, '78; Dall, Proc. U. S. N. M., 6, p. 338, '83; Bull. 37, U. S. N. M., p. 58, '89; Tr. W. I. S. 3, p. 969, 1900; Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903. Not of Tuomey and Holmes, 1857, which is *fossor*.

Distribution.—Hatteras to St. Thomas, W. I. Pleistocene to Recent, Gulf coast—Recent: Ft. Barranca, Indian Pass, St. Joseph's Bay, Crooked Isl., etc., Fla.; Horn Island, Miss. Pleistocene: New Orleans artesian well of 1856 at 41 and 76 feet, and Lake Borgne borings (Hilgard).

Note.—Coues studied the habits of this mollusc at Fort Macon where it is very abundant.

(*Machærodonax*) *galvestonensis* Harris

carinata (Hanley) Harris, 4th Ann. Rept. Geol. Surv. Tex., p. 121, 1892, (pub. 1893).

carinata var. *galvestonensis* Harris, Bull. Am. Pal., vol. 1, No. 3, p. 92, 1895.

Distribution.—Miocene of the Galveston artesian well, ranging in depth from 2552 to 2920 feet (Harris).

Note.—*Donax obesa* has been cited by Dall (Bull. 37, U. S. N. M., p. 58, 1889) and by Vanatta (Proc. A. N. S. Phila., 55, p. 757, 1903), from the Gulf at Indian Pass, St. Joseph's Bay, Crooked Isl., Fla.; Horn Island, Miss., and

Texas. But the true *Donax obesa* d'Orbigny (Voy. l'Amér. Mérid., p. 541, pl. 81, f. 28-30, 1846) is a west coast species, living from Panama to Paita, Peru. It is not identical with the Californian *Donax obesa* of Gould, 1851, which is *lævigata* Deshayes, 1854.

(*Iphigenia*) **brasiliانا** Lamarck, An. s. Vert., 5, p. 553, 1818, (as *Capsa*); Ency. Méth., pl. 261, f. 10; Dall, Bull. 37, U. S. N. M., p. 58, 1889; Nautilus, 5, p. 126, 1892; Dall and Simpson, Bull. U. S. Fish Com., 1, p. 476, 1901.

Distribution.—Florida to Rio de Janeiro and the Antilles. Gulf coast.—West Florida and Texas.

Genus **SOLE** Linnæus

viridis Say, Jour. A. N. S. Phila., 2, p. 316, 1821, Conrad, Am. Mar. Conch., 2, p. 28, pl. 5, f. 2, 1831; Dall, Bull. 37, U. S. N. M., p. 72, 1889; Tr. W. I. S., 3, p. 952, 1900.

Distribution.—Rhode Island to Georgia. Cited by Dall, 1889, from Sarasota, West Florida.

Genus **ENSIS** Schumacher

directus Conrad, Proc. Acad. Nat. Sci. Phila., 1, p. 325, 1843, (as *Solen*); Dall, Proc. U. S. N. M., 22, p. 107, 1899; Tr. W. I. S., 3, p. 954, 1900; Vanatta, Proc. A. N. S. Phila., 55, p. 757, '03; Clark, Md. Geol. Surv., p. 196, pl. 55, f. 9, 10, 1906.

magnodentatus H. C. Lea, Tr. Am. Phil. Soc., 2d Ser., 9, p. 236, pl. 34, f. 8, 1845. (as *Solen*).

ensis Conrad, Bull. Nat. Inst. 2, p. 191, 1842; Tuomey and Holmes, Pleio. Fos. S. C., p. 101, pl. 24, f. 3, 1857; Holmes, Post-Pl. Fos. S. C., p. 53, pl. 8, f. 13, 1860. Not of Linnæus, Syst. Nat. 1114.

americana Gould, Inv. Mass., p. 42, f. 366, '70; Verrill, Inv. An. Vineyard Sound, p. 674, pl. 32, f. 245, 1873; Dall, Proc. U. S. N. M., 6, p. 337, '83; Mitchell, List Tex. Sh., p. 3; Dall, Bull. 37, U. S. N. M., p. 72, pl. 53, f. 4, pl. 55, f. 4, 5, 1889.

Note.—The American species is larger and broader than the

European *Ensis ensis* of Linnæus, with which it was at first confused. Mitchell, who has studied the habits of this shell on the Texan coast, finds that it lives in a cell about four inches deep.

Distribution.—Labrador to Florida Keys, 0-25 fms. Miocene (Oak Grove, Fla.) to Recent. Gulf coast.—Cedar Keys, Crooked Isl., Fla.; Cameron, Chandeleurs, La.; Corpus Christi, Matagorda Bay, Laguna Madre, Texas.

minor Dall, Proc. U. S. N. M., 22, p. 108, 1899; Tr. W. I. S., 3, p. 955, 1900.

Solen ensis, "small variety", Conrad, 1831.

Distribution.—Cape May, New Jersey, to Texas. Pleistocene to Recent. Gulf coast.—Cedar Keys, St. Mark's, Fla.; Matagorda and Corpus Christi bays, Tex.

Genus **MACTRA** Linnæus

(*Mactrotoma*) *fragilis* Gmelin, Syst. Nat., p. 3261, No. 22, 1792; Reeve, Conch. Icon., 8, pl. 11, f. 47, 1854; Dall, Proc. U. S. N. M., 6, p. 338, 1883; Nautilus, 8, p. 26, 1894; Proc. Malacological Soc., 1, p. 211, 1895; Tr. W. I. S. 3, p. 894, pl. 27, f. 1, 4, 8, 18, 1898. Not *Spisula fragilis* Gray, 1838.

dealbata Pulteney, 1803.

braziliana Lamarck, An. s. Vert., 5, p. 478, 1818; Dall, Bull. 37, U. S. N. M., p. 62, 1889; Singley, 4th Ann. Rept. Tex., 1892; Mitchell, List Tex. Sh., p. 16.

ovalina Lamarck, of authors.

oblonga Say, Jour. A. N. S. Phila., 2, p. 310, 1822; *oblongata* Ravenel, 1834; *bilineata* (C. B. Adams) Reeve, 1854; *silicula* Reeve, 1854, not of Deshayes.

anserina Guppy, Ann. Mag. Nat. Hist. 15, p. 50, pl. 7, f. 1, 1875.

Distribution.—Hatteras to Rio de Janeiro, also cited from west coast of Africa. Pliocene to Recent. Gulf coast.—Recent: Cedar Keys, Fla.; Corpus Christi, Carancahua, Matagorda, and Espiritu Santo Bays, Texas. Pleistocene:

New Orleans Gymnasium Club well at 1200 feet, Pliocene : Caloosahatchie beds, Fla. Type of subgenus *Macrotoma* Dall.

Genus **SPISULA** Gray

(*Hemimactra*) **similis** Say, Jour. Acad. Nat. Sci. Phila., 2, p. 309, 1822 ; DeKay, Zool. New York, *Mollusca*, p. 230 ; Holmes, Post-Pl. Fos. S. C., p. 39, pl. 7, f. 8, 1860 ; Gould, Inv. Mass., Binney's ed., p. 75, '70 ; Dall, Bull. 37, U. S. N. M., p. 62, '89 ; Nautilus, 8, p. 26, 1894 ; Mitchell, List Texas Shells, p. 10 ; Singley, 4th Ann. Rept. Texas, p. 329, '92 ; Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903 ; Vaughan, 2d Ann. Rept. Fla., p. 148, 1909 ; Johnson, Occ. Papers, Bost. Soc. N. H., 7, p. 76, 1915. Not *Mactra similis* Gray, 1828.

Distribution.—Cape Cod to Antilles. Pliocene to Recent. Gulf coast.—Cedar Keys, Ft. Barranca, Indian Pass, St. Joseph's Bay, Crooked Island, Alligator Harbor (Franklin County), Fla. ; Horn Island, Miss. ; Cameron, La. ; Galveston, Corpus Christi and Matagorda Bays, Tex. Pleistocene : New Orleans pumping station No. 7, Grand Chênier, La. ; Orient, West Fla.

similis variety **raveneli** Conrad, 1831 ; Coues, Proc. A. N. S. Phila., p. 137, 1871 ; Dall, Nautilus 8, p. 26, 1894 ; Newcomb, MS. in coll., Dall, Tr. W. I. S., 3, p. 901, 1898.

Distribution.—Very abundant at Fort Macon, Ga. Gulf coast Ft. Barranca, Fla. ; Galveston, Tex. Pleistocene : Grand Chênier, La.

Note.—Indeterminable fragments of several species of *Mactra* and *Spisula* were found in the Pleistocene of the Zigler well No. 15, Jennings, La., at 1650-1700 feet ; Knapp's No. 2 well, Terrebonne Parish at 1731-1739 feet, and in the Miocene of the Jennings Heywood Oil Syndicate's No. 28 well at 1887-1880 feet.

quadricentennialis Harris, MS., Fifth Ann. Rept. Tex. Surv. (Unpublished) ; Dall, Proc. U. S. N. M., 17, p. 105, 1894 (as *Spisula*) ; Harris, Bull. Am. Pal., vol. 1, No. 3, p. 11,

pl. 2, f. 2, *a-c*, 1895 (as *Rangia*); Dall, Tr. W. I. S. 3, p. 905, 1898.

Gnathodon, n. sp. Harris, 4th Ann. Rept. Texas for 1892, p. 121, pub, 1893.

Note.—This curious shell appears to be a *Spisula* as the cartilage pit is not closed above. This is the second time only that the species has been found. It is interesting to trace it from Texas into Louisiana.

Distribution.—Upper Miocene: Galveston well at 2100-2249 feet (Harris); Jennings, La.—Dusen and Lyons Oil Company well No. 1 at 1860-1910 feet (?); Crowley No. 25 at 2585-2600 feet.

Genus *MULINIA* Gray

lateralis Say, Jour. A. N. S. Phila., 2, p. 309, 1822 (as *Mac-tria*); Conrad, Proc. A. N. S. Phila., p. 573, '63; Holmes, Post-Pl. Fos. S. C., p. 40, pl. 7, f. 9, '60; Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, '78; Dall, Bull. 37, U. S. N. M., p. 62, pl. 69, f. 8, '89; Harris, Bull. Am. Pal. 1, No. 3, p. 93, 1895; Dall, Nautilus 8, p. 27, '94; Tr. W. I. S., 3, p. 901, '98; Vanatta, Proc. A. N. S., 55, p. 757, 1903; Clark, Md. Geol. Surv., p. 194, pl. 55, f. 1-4, 1906; Vaughan, 2d Ann. Rept. Fla., p. 148, 1909; Dall, U. S. G. S., Water Supply Pa., 335, p. 77, 1914; Dall, U. S. G. S. Prof. Pa. 98-L., p. 177, 1916.

subtruncata Greene, 1833, not of Da Costa, 1788.

Distribution.—Maine to the Antilles. Miocene (of Duplin Co., N. C., and Pascagoula clays, Miss.) to Recent. Gulf coast.—Recent: Indian Pass, St. Joseph's Bay and Crooked Island (all in Calhoun Co.), Fla.; Horn Island, Miss.; Point au Fer, Cameron, La. Pleistocene: New Orleans Gymnasium well at 1200 feet, New Orleans pumping station No. 7; Knapp's wells, Terrebonne Parish, La., No. 2 at 1050 to 1842, No. 3, 700 to 2029 feet: Bayou City well, Beaumont, Texas, at 600 feet; Osprey, Orient and Labelle, West Fla.; Fort Morgan, Ala., well at 32-87, 100-112, 217-321 and 1290-1330 feet. Pleistocene to

Miocene : Galveston well, 300-2920 feet (Harris). Miocene : Jennings-Heywood Oil Syndicate's well No. 27 at 1970-1980 feet ; Gilbert well, No., 10, Bateson, Hardin Co., Tex., at 323 feet.

lateralis variety **corbuloides** Deshayes, Proc. Zool. Soc., p. 63, 1854 ; Reeve, Conch. Icon., *Mactra*, f. 103, 1854 ; Dall, Nautilus, 8, p. 27, 1894.

rostrata Philippi, Abbild u. Besch. 3, p. 138, pl. 3, f. 6, 1845. Not of Spengler, 1802.

Distribution.—With the typical form but generally in its southern range. Gulf coast.—Cameron, Point au Fer, La. ; Galveston, Corpus Christi, Sabine Pass, etc., Texas. Pleistocene : New Orleans pumping station No. 7 ; Grand Chênier, La. ; Osprey, West Fla.

sapotilla Dall, Tr. W. I. S., 3, p. 902, pl. 28, f. 7-9, 14, 1898 ; Proc. U. S. N. M., 46, p. 228, 1914.

Distribution.—Pliocene : Alexandria, La., well at 49 feet ; Producer's Oil Co.'s well, Pine Prairie, La. at 1540 feet. Very characteristic Caloosahatchie River marl, Fla. and also in the brackish water Pliocene of the Satilla River, Ga.

quadricentennialis Harris, Bull. Am. Pal., vol. 1, No. 3, p. 11, pl. 2, f. 3, *a*, *b*, 1895, (as *Mactra*).

Mactra, n. sp. Harris, 4th Ann. Rept. Texas Geol. Surv., p. 121, 1893.

Note.—This species resembles *sapotilla* Dall, but is in earlier horizons.

Distribution.—Upper Miocene, in deep wells of Texas and Louisiana. Type locality.—Galveston well at 2236-2871 feet (Harris) ; Jennings, La., wells : Teche No. 1 at 1158-1190 ; Producers, Latreille tract, No. 3, at 1975, No. 4 at 1720-1750, 1800-1860, No. 8 at 1990-2012 ; Zigler No. 15 at 1700-1745, 1745-1770 ; Crowley No. 19 at 1880-1885, 1940-1955, No. 24 at 1923-1935, No. 25 at 1830-1860, No. 36 at 1680-1700, 1800-1880 ; Jennings Heywood Oil Syndicate well No. 29 at 1941-1961 feet.

Genus **RANGIA** Desmoulins

cuneata Gray, In Sowerby, Gen. Shells, No. 36, f. 1-7, 1831, (as *Gnathodon*); Holmes, Post-Pl. Fos. S. C., p. 41, pl. 7, f. 10, '60; Hilgard, House Rep. Ex. Doc. 1, pt. 2, p. 887, '78; Dall, Bull. 37, U. S. N. M., p. 62, '89; Singley, 4th Ann. Rept. Tex., p. 329, '92; Dall, Proc. U. S. N. M., 17, p. 97, '94; Nautilus, 8, p. 27, '94; Tr. W. I. S., 3, p. 904, '98.

cyrenoides Desmoulins, Actes Soc. Lin. de Bordeaux, 5, p. 57, f. 1-3, 1832; Conrad, Proc. Acad. Nat. Sci. Phila., 1., p. 232, '61.

grayi Tuomey and Holmes, Pleio. Fos. S. C., p. 99, pl. 23, f. 11, 1857. Not of Conrad.

minor Holmes, Post-Pl. Fos. S. C., p. 41, 1860. Not of Conrad 1840=*R. clathrodon* Con.

Note.—Often referred to *Gnathodon* Gray, 1831, preoccupied by Goldfuss, 1820 (fish genus). This species is the genotype. *Rangia* is peculiar to North America. In Louisiana *R. cuneata* extends up streams into freshwater for several miles. Extremely abundant in Pleistocene time as shown by shell banks underlying Mobile and Charleston. In Pleistocene range extended north to Cornfield Harbor, Md., at the mouth of Potomac River. Extremely common in the Gulf State wells, extending to a depth of 2106 feet, (Teche No. 1), and not infrequently associated with *R. johnsoni*.

Distribution.—West Florida to Vera Cruz. Pascagoula Miocene to Recent. Gulf coast.—St Mark's, Ft. Barranca, Fla.; Mobile Bay, Ala.; Belle Isle, Point au Fer, Cameron, Lake Charles, La.; Matagorda Bay, Nueces River, etc., Texas. Pleistocene: Grand Chénier, New Orleans pumping station No. 7; Knapp's wells, Terrebonne Parish, No. 1 at 2000-2150, No. 2, from 1050 to 1842, No. 3, surface to 1800 feet; Bayou City well, Beaumont, Texas, 600 feet. Pliocene: Caloosahatchie, Fla. Pleistocene and Upper Miocene: Jennings wells, Franklin No. 1, 784

to 1621 feet; Teche No. 1, 876 to 2106; Dusen and Lyons, 1530 to 1860; Shippers, No. 4, 1240 to 1493; Jennings-Heywood, No. 27, 1980, No. 28, 800 to 1892, No. 29, 200 to 1940, No. 30, 1169 to 1840 feet.

cuneata variety **nasuta** Dall, Proc. U. S. N. M., 17, p. 98, pl. 7, f. 8, 1894.

Distribution.—Port Lavaca, Texas (type locality); Point au Fer, La. Recent, in salt water.

cuneata variety **solida** Dall, Proc. U. S. N. M., 46, p. 228, pl. 20, f. 7, 1913.

Distribution.—Pliocene: Alexandria, La., well at 49 feet.

Also Satilla River brackish water Pliocene beds, Atkinson, Ga.

cuneata variety **galvestonensis** Harris, Bull. Am. Pal. 1, No. 3, p. 93, pl. 2, f. 1, *a*, *b*, 1895.

Distribution.—Galveston deep well at 1510-2920 feet (Harris' locality); Prairie Mamou, La., well, with *R. johnsoni*, at approximately 2200 feet, Pascagoula Miocene horizon.

johnsoni Dall, Science, 20, p. 165, 1892, (as *Gnathodon*). *Nomen nudum*. Tr. W. I. S., 3, p. 337, pl. 22, f. 18, 1892; Proc. U. S. N. M., 17, p. 100, pl. 7, f. 7, 1894; Tr. W. I. S., 3, p. 905, 1898.

mobilians Johnson, Science, 20, p. 151, 1892. *Nomen nudum*.

Distribution.—Upper Miocene or maybe Early Pliocene.

In surface exposures, Greene Co., near Vernal, Miss. (Johnson's type locality, 1889); 3½ miles north of Merrill, Miss.; Shell Bluff, Pascagoula River, Miss., Tensas River, (?) Baldwin Co., Ala. Deep wells, Ala., Miss. and La. Very common in Jennings wells. The highest level at which *R. johnsoni* occurs in the Jennings field is at 1040-1120 feet, (Jennings-Heywood Oil Syndicate well No. 29), and the lowest at 2564-2664 feet (bottom of Franklin No. 1). Upper Miocene of deep wells: Mobile Brewery well at 750-770 feet; Mobile, Bascom No. 2, at 1241 feet; Mobile artesian well, 735 feet; Biloxi, Miss. artesian well, 700 feet; Jennings, La., wells, Bencken-

stein No. 3 at 1990 to 2045 ; Jennings-Heywood No. 24, 1700 ; No. 27, 1970-1980, No. 29, 1040-1961 ; Crowley No. 25, 1900 to 2650 ; Teche No. 1, 1322 to 2074 ; Franklin No. 1, 2183 to 2664 feet. Also in the Crowley well near Evangeline, La., at 2000 feet, where it was found with *galvestonensis*.

(*Rangianella*) *flexuosa* Conrad, Am. Jour. Sci. 38, p. 92, 1839 ; Pr. A. N. S. Phila., 7, p. 31, 1855, *Idem*, p. 232, for 1860 ; Dall, Mon. Genus *Gnathodon* ; Proc. U. S. N. M., vol. 17, p. 102, pl. 7, f. 3, 6, 1894 ; Mitchell, List Texas Shells. *rostrata* Petit, Jour. de Conch. 4, pp. 84, 164, pl. 5, f. 1-3, 1853, (as *Gnathodon*) ; Prime, Proc. Boston Soc. Nat. Hist. 7, p. 348, 1861 ; Conrad, Am. Jour. Conch. 3, suppl. p. 30, 1868 ; Dall, Bull. 37, U. S. N. M., p. 62, 1889 ; Singley, 4th Ann. Rept. Texas, p. 329, 1892.

Distribution.—Florida to Vera Cruz, salt water. Pleistocene to Recent. Rare. Gulf coast.—Recent : Point au Fer, La ; Galveston, Texas. Pleistocene : New Orleans pumping station No. 7.

Genus **LABIOSA** (Schmidt) Moller

lineata Say, Jour. A. N. S. Phila., 2, p. 310, 1822, (as *Lutraria*) ; Dall Bull U. S. N. M. p. 64, '89 ; Nautilus 8, p. 27, '94 ; Tr. W. I. S. 3, p. 906, 1898.

nuttallii Reeve, Conch. Icon., *Mactra*, f. 125, 1854. Not of Conrad.

recurva Gray, Wood's Ind. Test. Suppl., f. 2, 1828.

papyracea Conrad, Am. Conch., pl. 10 ; Adams, Genera Moll., 2, p. 386. Not of Lamarck.

Distribution.—New Jersey to Sao Paulo, Brazil. Gulf coast. West Fla., Cameron, La., and Texas.

(*Raeta*) *canaliculata* Say, Jour. A. N. S., Phila., 2, p. 310, 1822, (as *Lutraria*) ; Reeve, Conch. Icon., *Mactra*, f. 122, 1854 ; Holmes, Post-Pl. Fos. S. C., p. 43, pl. 7, f. 13, 1860 ; Dall, Bull. 37, U. S. U. S., p. 64, '89 ; Singley, 4th Ann. Rep., Texas, p. 330, '92 ; Dall, Nautilus, 8, p., 28, '94 ; Harris, Bull. Am. Pal. 1, No. 3, p. 94, '95 ; Mitchell,

List Tex. Sh. ; Dall, Tr. W. I. S., p. 907, '98 ; Vanatta, Proc. A. N. S. Phila., 55, 757, 1903.

campechiensis Gray, Wood's Ind. Test. Suppl., f. 3, 1828.

Distribution.—New Jersey to Southern Brazil. Type of subgenus *Raëta* Gray. Pleistocene to Recent. Gulf coast. Recent : Alligator Harbor (Franklin County), Indian Pass (Calhoun County), Fla. ; Horn Island, Miss. ; Point au Fer, Cameron, La. ; Galveston, Matagorda Bay, Corpus Christi, Tex. Pleistocene : Osprey, Fla. ; New Orleans pumping station No. 7, Knapp's wells, Terrebonne Parish, No. 2 at 1542-1632, No. 3 at 1330-1375 feet. Pleistocene to Upper Miocene : Galveston deep well, from 46 to 2871 feet (Harris).

Genus **ERVILIA** Turton

concentrica Gould, Otia Conch., p. 329 ; Proc. Bost. S. N. H., 8, p. 280, 1862, Dall, Bull. 37, U. S. N. M., p. 62, '89 ; Dall and Simpson, Bull. U. S. Fish Com., 1, p. 474, pl. 58, f. 2, 1901 ; Vanatta, Proc. A. N. Phila., 55, p. 757, 1903.

Distribution.—Hatteras to Florida, 124 fms. Gulf coast.—Recent : St. Joseph's Bay and Crooked Isl., West Fla.

planata Dall, Tr. W. I. S., 3, p. 915, 1898.

Distribution.—Miocene of Oak Grove, West Fla., and of the Bascom No. 1 well, Mobile, Ala., 1500-1556 feet (Aldrich).

Genus **CORBULA** Bruguière

(**Aloidis**) **disparilis** d'Orbigny, In Sagra's Hist. Pol. y Nat. Isla de Cuba, 2, p. 283, pl. 27, f. 1-4, 1845 ; Dall, Bull. 37, U. S. N. M., p. 70, pl. 1, f. 4 *a-b*, 1889 ; Tr. W. I. S., 3, p. 853, 1898.

philippi Smith, 1885 ; *operculata* Philippi, 1849.

Distribution.—Hatteras to Barbados, 5-805 fms. Pliocene to Recent. Gulf coast.—Off West Florida in 30 and 50 fms. Pleistocene : Teel No. 1 well, Saratoga, Tex. at 940 feet ; Knapp's No. 3 well, Terrebonne Parish, La., 1330-1375 feet.

(**Aloidis**) **galvestonensis** Harris, Bull. Am. Pal., 1, No. 3, p. 94,

pl. 2, f. 4, 4 *a*, 1895 ; Dall, Tr. W. I. S., 3, p. 852, 1898;
In Deussen, U. S. G. S., Water Supply Paper, 335, p. 77,
1914.

Distribution.—Upper Miocene, Galveston well, 2443-2650 feet
(Harris); Gilbert well No. 10, Bateson, Hardin Co., Tex-
as, at 323 feet (Dall).

(*Aloidis*) *heterogenea* Guppy, MS. in coll., Dall, Tr. W. I. S., 3,
p. 850, pl. 36, f. 15, 1898.

Distribution.—Miocene of Gatun and of the Chipola and Oak
Grove beds, Fla., and of the Bascom No. 2 well, Mobile,
Ala., at 1241 feet. Pliocene of the Caloosahatchie, Fla.

(*Cuneocorbula*) *contracta* Say, Jour. Acad. N. S. Phila., 2, p. 312,
1822 ; DeKay, Nat. Hist. N. Y., 5, p. 241, pl. 28, f. 285,
'43 ; Reeve, Conch. Icon., *Corbula*, pl. 4, f. 27, '44 ;
Holmes, Post-Pl. Fos. S. C., p. 56, pl. 8, f. 17, '60 ;
Gould, Inv. Mass., Binney's ed., p. 90, f. 377, '70 ; Dall,
Bull. 37, U. S. N. M., p. 70, pl. 1, f. 6 *a*, *b*, pl. 59, f. 10,
'89 ; Tr. W. I. S., 3, p. 855, '98 ; Clark, Md. Geol. Surv.,
p. 193, pl. 53, f. 1-4, 1906 ; Johnson, Occ. Pa., Bost. S.
N. H., 7, p. 78, 1915.

cuneata Tuomey and Holmes, Pleio. Fos. S. C., p. 75, pl.
20, f. 11, 1857 ; Hilgard, House of Rep. Ex. Doc. 1, pt.
2, pp. 887, 889, '78. Not *cuneata* Say, Jour. A. N. S.
Phila., 4, p. 152, pl. 13, f. 3, 1824, which is a Miocene to
Pleistocene species, not Recent.

Distribution.—Cape Cod, Mass., to Jamaica, 3-60 fms. Pliocene
to Recent. Gulf coast.—West Fla. and Galveston.
Pleistocene : New Orleans pumping station No. 7 ; Lake
Borgne borings ; Knapp's wells, Terrebonne Parish, La.,
No. 1 at 1600 to 2443, No. 2 at 1190 to 1842, No. 3 at 570
to 1739 feet ; Teel No. 1 well, Saratoga, Texas, at 940
feet.

(*Cuneocorbula*) *barrattiana* C. B. Adams, Contr. Conch., 12, p.
237, 1852 ; Dall, B. M. C. Zool., 12, 313, pl. 2, f. 7 *a-c*,
1886 ; Bull. 37, U. S. N. M., p. 70, pl. 2, f. 7 *a-c*, 1889 ;
Tr. W. I. S., 3, p. 856, 1898.

Distribution.—Hatteras to Jamaica, 2-287 fms. Pliocene to Recent. Gulf coast.—Recent: West Florida, 30 fms. Pliocene: Caloosahatchie marl.

(*Cuneocorbula*) *engonata* variety *burnsi* Dall, Tr. W. I. S., 3, p. 847, 1898.

Distribution.—Upper Oligocene of Tampa, Fla., and Lower Miocene of the Chipola marl, Fla., and of the Bascom well No. 2, Mobile, Ala., at 1241 feet, Chipola horizon (Aldrich).

(*Cuneocorbula*) *swiftiana*, C. B. Adams, Contr. Conch., 12, p. 236, 1852; Dall, B. M. C. Z., 9, p. 114, '81; 12, p. 314, pl. 2, f. 5 *a-c*, '86; Dall, Bull. 37, U. S. N. M., p. 70, pl. 2, f. 5 *a-c*, '89; Tr. W. I. S., 3, p. 855, 1898.

Distribution.—Hatteras to Venezuela. Recent. Typical form not on Gulf coast.

swiftiana variety *harrisi* Dall, Tr. W. I. S., 3, p. 855, 1898.

Corbula, sp. indet., Harris, 4th Ann. Rept. Texas for 1892, p. 121, pub. 1893.

swiftiana ? Harris, Bull. Am. Pal. 1, No. 3, p. 94, pl. 2, f. 6, 1895.

Distribution.—Pleistocene to Upper Miocene, Galveston well, 300 (?) to 2920 feet (Harris).

(*Cuneocorbula*) *dietziana* C. B. Adams, Contr. Conch., p. 235, 1852; Dall, Bull. M. C. Z., 9, p. 114, '81; 12, p. 314, pl. 1, f. 5, *a-b*, 1886; Bull. 37, U. S. N. M., p. 70, pl. 1, f. 5, *a-b*, 1889.

Distribution.—Hatteras to Barbados, 14-100 fms. Gulf coast. Dredged off West Florida, 30 fms.

(*Cuneocorbula*) *whitfieldi* Dall, Tr. W. I. S., 3, p. 849, pl. 36, f. 18, 1898.

Distribution.—Miocene of Oak Grove sands, West Fla., and (a varietal form) Bascom No. 1 well, Mobile, Ala., at 1500-1556 feet, Oak Grove horizon (Aldrich).

(*Cuneocorbula*) *conradi* Dall, Tr. W. I. S. 3, p. 842, 1898.

nasuta Conrad, Mexican Boundary Rept. I, p. 161, pl. 19, f. 4, 1857; Singley, 4th Ann. Rept. Texas, p. 330, 1892; Dall, Bull. 37, U. S. N. M., p. 70, pl. 2, f. 6 *a, b, c, d*

1889. Not *nasuta* Conrad, Fos. Med. Tert. Form., p. 38, 1883=*alabamiensis* Lea, Eocene. Not *nasuta* Sowerby, Proc. Z. S., p. 35, 1883, which is a Recent, West Coast Central American species.

Distribution.—Hatteras to Haiti, 4-63 fms. Gulf coast. West Fla. and Tex.

(*Erodona*) *priscopsis* Harris, Bull. Am. Pal., vol. 1, No. 3, p. 94, pl. 2, f. 5, 5 *a*, 1895; Dall, Tr. W. I. S., 3, p. 853, '98.

Note.—The only member of the section *Erodona* Daudin (*Potamomya* Sowerby, 1835; *Azara* d'Orbigny, 1839), ever found in the North American marine coastal Tertiary. Type *Mya labiata* from South American estuaries. Upper Miocene, Galveston well at 2443-2448 feet (Harris).

(*Bothrocorbula*) *radiatula* Dall, Tr. W. I. S., 3, p. 851, pl. 36, f. 1-3, 1898.

Distribution.—Miocene of Oak Grove, Fla., and of the Bascom well, Mobile, Ala., at 1241 feet.

Genus **PARAMYA** Conrad

subovata Conrad, Fos. Med. Tert., p. 65, pl. 36, f. 4, 1845, (as *Myalina*); Proc. A. N. S., Phila., for 1860, p. 232; Dall, Bull. 37, U. S. N. M., p. 70, 1889; Tr. W. I. S., 3, p. 861, 1898.

Distribution.—North Carolina to Florida, 12-30 fms. Miocene (of Va. and N. C.) to Recent. Gulf coast.—West Fla.

Genus **SAXICAVA** Fleuriau

artica Linnæus, Syst. Nat., ed, XII, p. 113, 1767, (as *Mya*); Dall, Bull. 37, U. S. N. M., p. 70, pl. 59, f. 13, 1889; Tr. W. I. S., 3, p. 834, 1898; Johnson, Occ. Pa., B. S. N. H., 7, p. 78, 1915.

rugosa Lamarck, 1818, Gould, 1870. For other synonyms see Dall, 1898.

Distribution.—Arctic Sea to Barbados, 0-100 fms. Miocene (of Md., N. C. and N. J.) to Recent. Gulf coast.—Recent: West Fla. Pliocene: Caloosahatchie beds.

azaria Dall, Bull. M. C. Zool., 9, p. 116, 1881; 12, p. 317, pl. 4,

f. 9 *a-b*, 1886; Bull. 37, U. S. N. M., pl. 4, f. 9 *a-b*, '89.

Distribution.—Gulf of Mexico.—Off Charlotte Harbor, Fla., 13 fms.; 16 miles N. of Jolbos Isls., 14 fms.

Genus **PANOPE** Menard

bitruncata Conrad, Proc. A. N. S. Phila., for 1872, p. 216, pl. 7, f. 1; Dall, Tr. W. I. S., 3, p. 832, 1898; Vanatta, Proc. A. N. S. Phila., 55, p. 757, 1903.

Distribution.—North Carolina to Florida. Gulf coast at Tampa and Crooked Isl., West Fla.

floridana Heilprin, Tr. W. I. S., 1, p. 91, pl. 10, f. 21, 1887; Dall, Tr. W. I. S., 3, p. 831, 1898.

menardi Heilprin, Tr. W. I. S., 1, p. 90, pl. 9, f. 19, 1887. Not of Deshayes.

navicula Heilprin, *Idem*, p. 91, pl. 10, f. 22, 1887.

reflexa, Dall, Bull. 37, U. S. N. Mus., p. 70, 1889, (as *Glycymeris*); Not *reflexa* Say, 1824, which is Miocene only.

Distribution.—North Carolina and Gulf coast at Mobile Point, Ala. Pliocene of the Caloosahatchie beds, West Fla.

Genus **GASTROCHAENA** Spengler

ovata Sowerby, Proc. Zool. Soc., p. 21, 1834; Hanley, Descr. Cat. Rec. Sh., p. 10, pl. 9, f. 42, 1842; Dall, Bull. 37, U. S. N. M., p. 72, 1889; Tr. W. I. S., 3, p. 824, 1898.

Distribution.—Charleston, N. C. to the West Indies, 0-27 fms. Gulf coast.—West Fla.

cuneiformis Spengler, Nova Acta Soc. Hafn., 2, p. 179, f. 8-11, 1788; Lamarck, An. s. Vert., 5, p. 447, 1818; Dall, Bull. 37, U. S. N. M., p. 72, '89; Tr. W. I. S., 3, p. 825, 1898.

hians Gmelin, 1792, (as *Pholas*); H. and A. Adams, 1856, (as *Rocellaria*); Tryon, 1862.

rupestris Bosc, Hist. Nat. Coq., 2, p. 205, 1802.

Distribution.—Cape Fear, N. C., to Guadeloupe, 0-25 fms. Gulf coast.—West Fla.

(*Spengleria*) *rostrata* (Spengler) Dall, Bull. 37, U. S. N. M., p. 72, '89; Tr. W. I. S., 3, p. 824, '98.

Distribution.—West Florida to St. Thomas, W. I. Type of subgenus *Spengleria*, Tryon.

Genus **PHOLAS** Linnæus

(*Thovana*) *campechiensis* Gmelin, Syst. Nat., 6, p. 3216, 1792; Hanley, Descr. Cat. Rec. Sh., p. 6, pl. 9, f. 44, 1842; Tryon, Proc. A. N. S. Phila., p. 76, 1862; Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, '78; Dall, Bull. 37, U. S. N. M., 72, 1889; Tr. W. I. S., 3, p. 815, '98.

oblongata Say, Jour. Acad. Nat. Sci. Phila., 2, p. 320, 1822; Holmès, Post-Pl. Fos. S. C., p. 58, pl. 9, f. 2, '60. Not of Tuomey and Holmes, Pleio. Fos. S. C., p. 103, pl. 24, f. 5, 1857 which, is *producta* Conrad.

candeana d'Orbigny, Moll. Cuba, p. 215, pl. 25, f. 18-19, 1845.

Distribution.—Hatteras to Brazil. Pleistocene to Recent. Gulf coast.—West Fla. and Texas.

Genus **BARNEA** (Leach) Risso

costata Linnæus, Syst. Nat., ed. X, p. 669, 1758; Lamarck, An. s. Vert., 5, p. 445, 1818; Holmes, Post-Pl. Fos. S. C., p. 58, pl. 9, f. 1, 1 a, '60; Gould, Inv. Mass., Binney's ed., p. 36, f. 363, '70; Hilgard, House of Rep. Ex. Doc. 1, pt. 2, p. 887, '78; Dall, Bull. 37, U. S. N. M., p. 72, pl. 68, f. 9, 1889; Singley, 4th Ann. Rept. Tex., p. 331, '92; Dall, Tr. W. I. S., p. 816, '98; Clark, Maryland Geol. Surv., p. 192, pl. 52, 1906.

virginianus Lister, Hist. Conch., ed. II, pl. 5, f. 434, 1770.

Distribution.—Massachusetts to Brazil. Pliocene to Recent. Gulf coast.—Recent: Indian Pass (Calhoun Co.), Fla.; Point au Fer, Cameron, Chandeleurs, La.; Galveston, Corpus Christi, Matagorda Bay, Tex. Pleistocene: Grand Chênier, New Orleans artesian well of 1856, at 41, 66, 235, 546 feet; New Orleans pumping station No. 7, Lake Borgne borings; Knapp's wells, Terrebonne Parish, No. 2 at 1434-1519, 1519-1542, No. 3 at 570-700, 1200-1300, 1330-1375 feet.

Note.—This is the larger and more fragile descendant of the Miocene species *arcuata* Conrad. Popularly named the angel's wing. Mitchell has studied its habits on the Texan coast.

truncata Say, Jour. Acad. Nat. Sci, Phila., 2, p. 321, 1822; Sow-erby, Thes. Conch., 1, p. 488, pl. 104, f. 29, 30, '49; DeKay, Zool. N. Y., Moll., p. 248, pl. 34, f. 323 *a-b*, '43; Holmes, Post-Pl. Fos. S. C., p. 57, pl. 9, f. 4, '60; Gould, Inv. Mass., Binney's ed., p. 38, f. 364, 1870; Dall, Bull. 37, U. S. N. M., p. 72, pl. 59, f. 12, 1889; Singley, 4th Ann. Rept. Tex., p. 331, '92; Mitchell, List Texas Shells, p. 2; Dall, Tr. W. I. S., 3, p. 816, '98; Johnson, Occ. Pa. B. S. N. H., 7, p. 79, 1915.

Distribution.—Maine to Texas. Pleistocene to Recent. Gulf coast.—West Florida; Corpus Christi, Matagorda and Es-piritu Santo Bays, Texas.

maritima (d'Orbigny) Dall, Bull. 37, U. S. N. M., p. 72, 1889.

Distribution.—Cited by Dr. Dall from West Fla. and Texas.

Genus **MARTESIA** Leach

cuneiformis Say, Jour. A. M. S. Phila., 2, p. 322, 1822, (as *Pholas*); Gibbes, Tuomey's Geol. S. C., app., p. 22; DeKay, Zool. New York, Moll., p. 248, '43; Holmes, Post-Pl. Fos. S. C., p. 59, pl. 9, f. 3, '60; Tryon, Mon. Pholadacea, p. 91, '62; Dall, Proc. U. S. N. M., 4, p. 337, '83; Bull. 37, U. S. N. M., p. 72, '89; Mitchell, List Tex. Sh.; Dall, Tr. W. I. S., 3, p. 820, '98; Johnson, Nautilus, 18, p. 101, f. 2, 1904; Occ. Pa., B. S. N. H., 7, p. 80, 1915.

Distribution.—Connecticut to Trinidad. Miocene (of Va.) to Recent. Gulf coast.—Cedar Keys, Fla.; Texas.

striata Linnæus, Syst. Nat., ed. XII, p. 1111, 1767, (as *Pholas*); Tryon, Mon. Pholadacea, p. 92, 1862; Fischer, Man. de Conch., p. 1136, pl. 23, f. 21, '87; Dall, Bull. 37, U. S. N. M., p. 72, '89; Johnson, Nautilus, 18, p. 100, f. 1, 1904.

clavata Lamarck, An. s. Vert., 5, p. 446, 1818, (as *Pholas*).
Genotype.

Distribution.—South Carolina to Grenada Isl. Also England, 0-12 fms. Often burrowing in driftwood. Pliocene (Trinidad and Costa Rica, Guppy and Gabb) to Recent. Gulf coast.—West Florida; Cameron, Chandeleurs, La.; Galveston, Tex. Pleistocene: New Orleans pumping station No. 7 (?)

corticaria Sowerby, Thesaurus Conch., 2, p. 495, pl. 108, f. 94-96, 1855, (as *Pholas*); Tryon, Mon. Phol., p. 92, 1862; Dall, Bull. 37, U. S. N. M., p. 72, '89; Johnson, Nautilus, 18, p. 101, 1904.

Distribution.—Charlotte Harbor, West Florida, to Guadeloupe. Placed by Johnson in synonymy of *M. striata*. Sowerby's type found in drifted mahogany log.

(*Diplothyra*) *caribæa* d'Orbigny, In Sagra's Hist. Pol. y Nat. Isla de Cuba, 2, p. 281, f. 20-21, 1845 (Spanish ed.); French ed., p. 211, pl. 25, f. 20-21, 1853, (as *Pholas*); Johnson, Nautilus, 18, p., 102, f. 3, 1904.

smithi Tryon, Proc. A. N. S. Phila., p. 450, 1862; Mon. Pholadacea, p. 126, f. 2, 1862; Dall, Bull. 37, U. S. N. M., p. 72, 1889; Johnson, Nautilus, 18, pp. 102, 103, 1904.

Distribution.—Staten Island, N. Y., to Cuba, boring in shells and limestone. Gulf coast.—Manatee River, West Fla., and Texas.

Genus **TEREDO** Linnæus

navalis Linnæus, Syst. Nat., ed. XII, p. 1267, 1767; Forbes and Hanley, Brit. Moll. 1, p. 74, pl. 1, f. 7, 8, pl. 18, f. 3, 4; Tryon, Proc. A. N. S., Phila., p. 468, Sept. 1862; Gould, Inv. Mass., Binney's ed., p. 28, 355, '70; Dall, Bull. 37, U. S. N. M., p. 74, pl. 55, f. 6, pl. 59, f. 2, '89; Singley, 4th Ann. Rept. Texas, p. 331, '92; Mitchell, List Texas Shells, p. 17; Johnson, Occ. Pa., Bost. S. N. H. 7, p. 81, 1915.

marina Sellius, Nat. Hist. Tered. tab. 2, f. 2, 3, 6, 1733.

Note.—The borings of this famous shipworm suggested to Brunel many years ago his method of tunneling the Thames. First recognized as a bivalve mollusca by Sellius, in 1733.

Distribution.—Arctic Ocean to Florida. Recent. Gulf coast. West Fla., Galveston and the entire Texan coast. Very destructive to wooden wharves at Galveston. Found in driftwood, Texas coast, by Roemer, in 1849.

megotara Forbes and Hanley, Brit. Conch., 1, p. 77, pl. 4, f. 6, pl. 18, f. 1, 2, 1853; Sowerby, Ill. Br. Shells, pl. 1, f. 3; Tryon, Pr. A. N. S. Phila., p. 466, '62; Gould, Inv. Mass., Binney's ed., p. 30, f. 357, '70; Dall, Pr. U. S. N. M., 6, p. 337, '83; Bull. 37, U. S. N. M., p. 74, pl. 59, f. 3, pl. 65, f. 127, '89; List Cameron Shells (MS.).

Note.—Placed by Johnson in synonymy of *Teredo nana* Turton, (Conch. Insul. Brit., p. 16, pl. 2, f. 6, 7, 1822).

Distribution.—Arctic Ocean to Florida. Pleistocene to Recent. Gulf coast.—Cedar Keys, Fla.; Cameron, La.

norvegica Spengler, Skriv. Nat. Selsk Kjobenhaven, 2, pt. 1, p. 102, pl. 2, f. 4-6, 1792; Gould, Inv. Mass., p. 29, f. 356, 1870; Dall, Bull. 37, U. S. N. M., p. 74, pl. 68, f. 2, '89; Johnson, Occ. Pa. Bost. S. N. H., 7, p. 81, 1915.

Distribution.—Northern Europe and New York to Florida. Gulf coast.—Manatee, West Fla.

thomsoni Tryon, Proc. A. N. S. Phila., p. 280, pl. 2, f. 3-5, 1863; Gould, Inv. Mass., p. 31, f. 358, 1870; Dall, Bull. 37, U. S. N. M., p. 74, pl. 59, f. 4, 1889; Johnson, Occ. Pa., B. S. N. H., 7, p. 81, 1915.

Distribution.—Cape Cod, Mass., southward. Cited by Dr. Dall from West Fla.

(**Lyrodus**) **chlorotica** Gould, Inv. Mass., Binney's ed., p. 33, f. 360, 1870; Dall, Proc. U. S. N. M., 6, p. 337, 1883; Bull. 37, U. S. N. M., p. 74, pl. 68, f. 3, 1889; Johnson, Occ. Pa., Bost. S. N. H., 7, p. 82, 1915.

Distribution.—Massachusetts Bay to Florida. Recent. Type of subgenus *Lyrodus* Gould. Gulf coast.—Cedar Keys, Fla.

Genus **XYLOTRYA** Leach

fimbriata Jeffreys, Syn. Brit. Tereido, Ann. and Mag. Nat. Hist. 3d ser., 6, p. 126, 1860; Tryon, Proc. A. N. S. Phila., 13, p. 478, '62; Gould, Inv. Mass., Binney's ed., p. 34, f. 361, 1870; Dall, Bull. 37, U. S. N. M., p. 74, pl. 59, f. 1, '89; List Cameron Sh., 1906 (MS.); Johnson, Occ. Pa. Bost. Soc. N. H., 7, p. 82, 1915.

palmulata of Forbes and Hanley, Perkins, and a number of other authors; but not *palmulata* Lamarck, An. s. Vert., 2d ed., 6, p. 38; nor of Philippi.

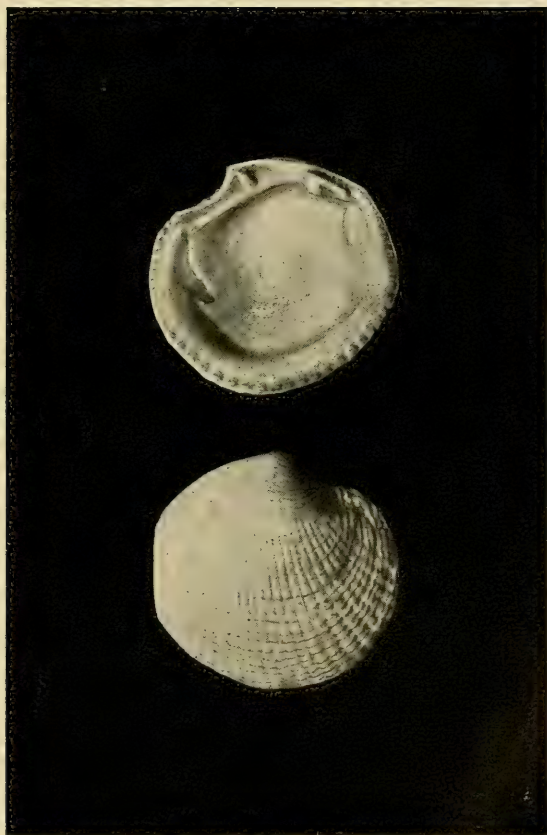
Distribution.—Rhode Island to the Gulf of Mexico, burrowing in wharves and timbers. Gulf coast.—Errol Isl., West Fla.; Chandeleurs, La.; Texas.

fimbriata variety **subæqualis** Dall, Proc. U. S. N. M., 6, p. 337, 1883.

Distribution.—Cedar Keys, Fla.

bipennata (Turton) Jeffreys, Ann. and Mag. Nat. Hist., 3d ser., 6, p. 126, 1860; Dall, Bull. 37, U. S. N. M., p. 74, 1889.

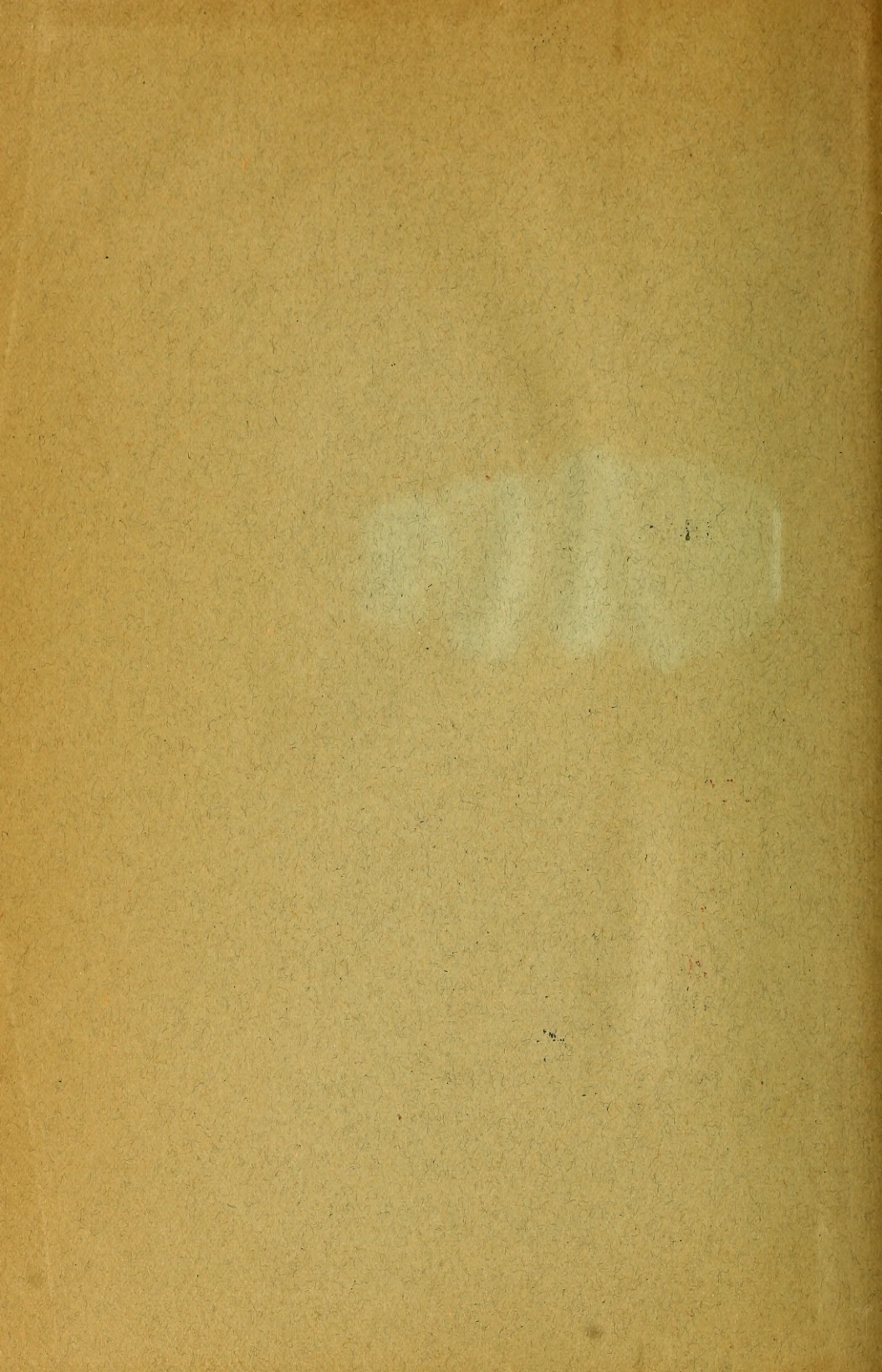
Distribution.—North Atlantic to St. Vincent, W. I. Gulf coast.—West Florida.



Phacoides (Parvilucina) frontis, n. sp.

See page 57







3 2044 114 205 164

Date Due

~~11 Jun 50~~~~NOV 22 1950~~~~MAY 11 1955~~~~JAN 1970~~~~DEC 1971~~~~JAN 1973~~~~OCT 1973~~~~JUL 78~~~~JUL 29 1983~~~~APR 28 1989~~

